TELEX®

RADIO DISPATCH PRODUCTS

Model IP-223
Remote Adapter Panel
Technical Manual

up to and including version 4.100

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CHAPTER 1

Overview

The IP-223 Remote Adapter Panel provides a reliable means of remotely controlling two (2) audio devices. The adapter has multiple modes allowing it to connect to both digital and analog consoles, and performs a variety of other tasks related to putting radios on a digital network.

The IP-223 is interconnected to the distant remote control console(s) by means of any available **WAN** (Wide Area Network) or **LAN** (Local Area Network) connection.

Operating Modes

The IP-223 is capable of operating each audio port in different modes:

Local Mode – The radio is connected directly to the IP-223 allowing for simple migration and local control of the radio.

Tone Mode – The IP-223, based on Ethernet traffic, generates the keytones required to control standard industry tone-equipped radio circuits. This allows an existing tone decoder and radio to be connected. This mode also supports a parallel analog console.

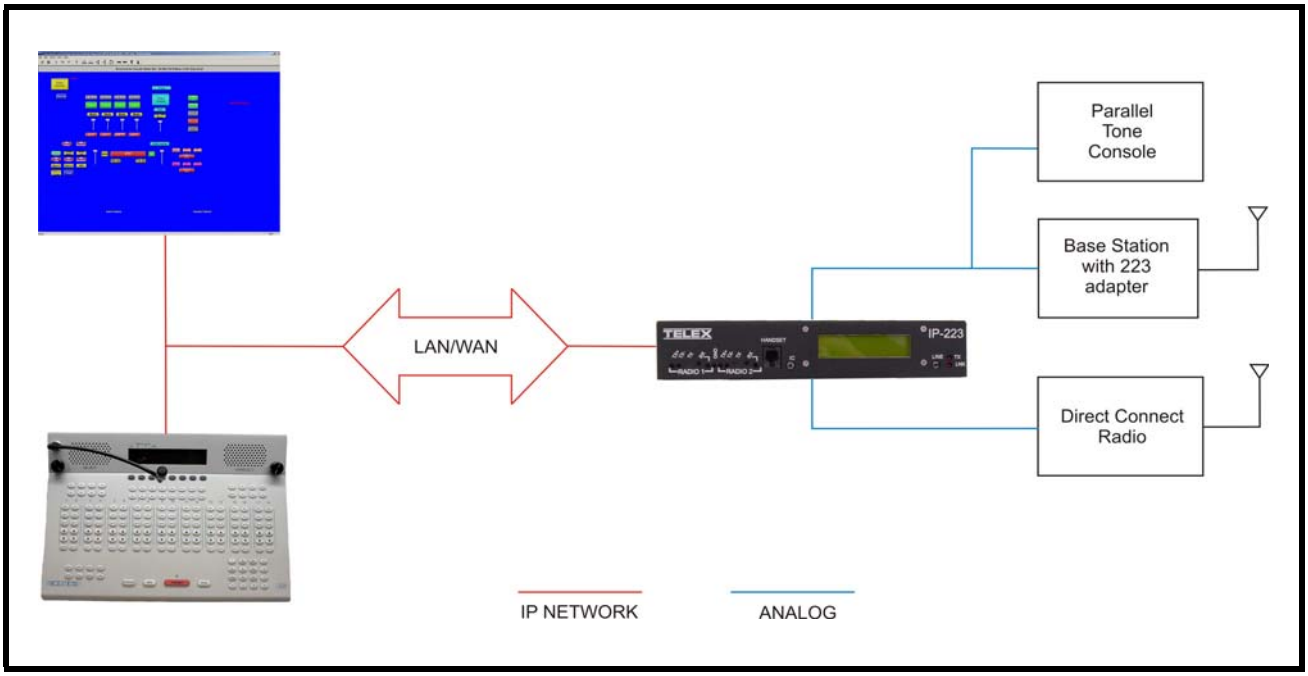

FIGURE 76. Local and Tone Mode Connections

Console Mode – Allows the use of existing tone-based consoles. The IP-223 decodes industry standard tones, converts it to Ethernet traffic to another IP-223 that can be in tone or local mode.

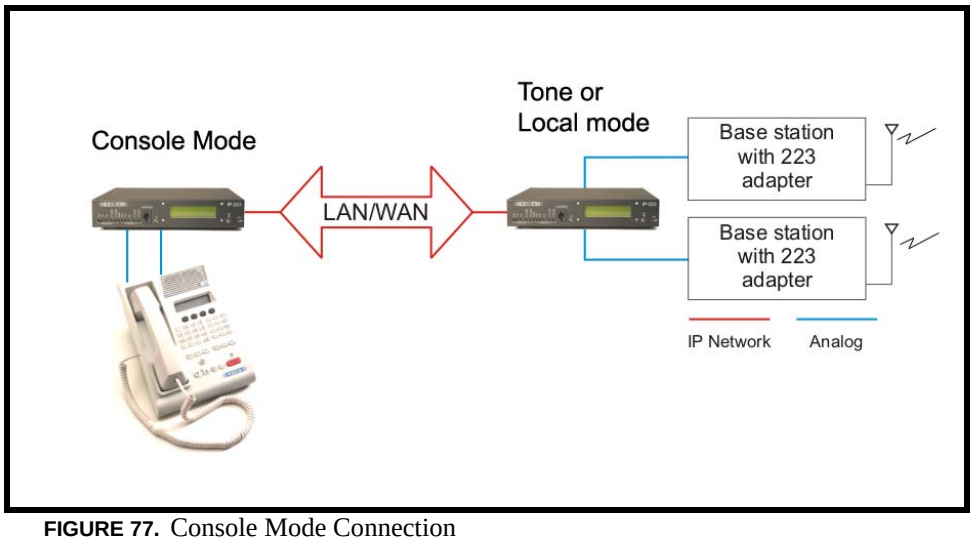

FIGURE 77. Console Mode Connection

Phone Mode – Using a **PIB** (Phone Interface Box) or **TDI** (Telephone Dispatch Interface), a line on the IP-223 is used to connect to an analog phone line.

iDen Radio Mode – Using the NI-223, allows interface with a Falcon Class **PTT** (Push-To-Talk) mobile phone system.

TETRA Radio Mode – Used to interface to a TETRA digital trunked system using the IP-223 and the Sepura SRM2000 mobile radio. The IP-223 interfaces the radio through the **PEI** (Peripheral Equipment Interface) allowing dispatch access to TETRA radio assets.

Features

NOTE: The features listed below for the IP-223 version 4.100 do not comprise the full feature set. For more information on all the features available, contact Radio Dispatch Sales listed on www.telex.com

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- Ethernet TX and LINK LEDs
- PTT, Monitor, F1 and F2 relays (programmable to any function tone or revert to F1)
- Four (4) PTT modes and three (3) monitor modes
- Nine (9) selectable PTT frequencies
- Seven (7) digital outputs for channel selection, completely programmable per function tone
- **CTCSS** (Continuous Tone Coded Squelch System) generation (64 frequencies)
- Hardware and software gain control
- Local handset port for monitoring activity and transmission back to base or to radio
- RS-232C port on rear for initial configuration and direct radio control
- Single function tone recognition (16 function tones)
- **RX** (Receive) audio squelch
- Crosspatch capability
- **ANI** (Automatic Number Identification) over-the-air-protocol—decode and display
- Provides iDEN interface
- Supports Sepura SRM2000, TETRA radio
- E.F. Johnson RS5300 P25 radio interface
- Remote Crosspatch capabilities
- POTS line fail-over
- Phone line interface
- MDC and Fleetsync Decode
- 5/6 Tone signalling encode/decode
- Kenwood radios interface

NOTE: Transient protection is provided near all audio inputs and outputs. The IP-223 line transformers are not designed to operate on lines carrying **DC (**direct current). If a voltage is on the line, isolate with external capacitors. If the line termination must conduct direct current, install a 600:600 Ohm transformer designed for the current involved.

IP-223 Accessories

There are several optional **accessories** available for the IP-223:

Part Number	Description
223RACK	1 unit high rack shelf to hold up to two (2) IP-223 units
2490248	Alignment Handset
730153	Power Supply
301611000	Fleetsync Over the Air Decode
301611004	FleetSync Encode/Decode
301611001	MDC Over the Air Decode
301912000	NI-223
PRD000003000	IP223 to EFJohnson 5300 Mobile Radio Advanced Control Interface Box
301953000	IP223DB9Splitter - Serial Port splitter cable DB9
301956000	IP223CAB150/180 - IP223-Kenwood TK-150/180 cable
301957000	IP223CAB90 - IP223-Kenwood TK-90 cable
301969000	IP223CABCDM1250 - IP-223-Motorola CDM and GM cable
301961000	IP223CAB2000 - IP-223-Sepura SRM2000 cable
879794	IP223CAB Tone - IP-223-Dual DB25 Tone cable 24ft.

IP-223 Specifications

The specifications for the IP-223 are listed in Table 1. The specifications are subject to change without notice.

CAUTION: This device is **NOT** PoE (Power Over Ethernet) compatible.

TABLE 1. IP-223 Specifications

Operating Temperature Range	0 to 70°C for full specifications
Power Requirements	+12 to +16Vdc, semi-regulated, ~700mA
Ethernet Speed	10 BaseT or 100 BaseTX
Lease Lines	2W and 4W supported
Radio Interface	±45VDC withstand rating
Relay Contact Ratings	1A at 125Vac
Non-Relay Outputs	Open collector, active low, 200mA maximum, 40V collector to emitter voltage
Radio Input Level	10mVpp to 10Vpp, adjustable
Radio Output Level	10mVpp to 10Vpp for mic level or -40 to +10dBm into 600Ω load, adjustable
Radio Output Impedance	600Ω for balanced mode, 200Ω for single ended mode
Frequency Response	±1.5dB, 300 to 3000Hz
Audio Distortion	2% THD maximum
DTMF Detection Bandwidth	± 25 Hz around center of frequency
MON timer	10ms to 9999ms, adjustable
Dimensions	8 ½” (215.9mm) Wide, 9 3/4” (247.65mm) Deep, by 1 5/8” (41.275mm) High
Actual Weight	3.75lb (1.701kg)
Shipping Weight and Dimensions	5lbs (2.267kg) ~ 12”(304.8mm) x 10”(254mm) x3”(76.2mm)

Front Panel

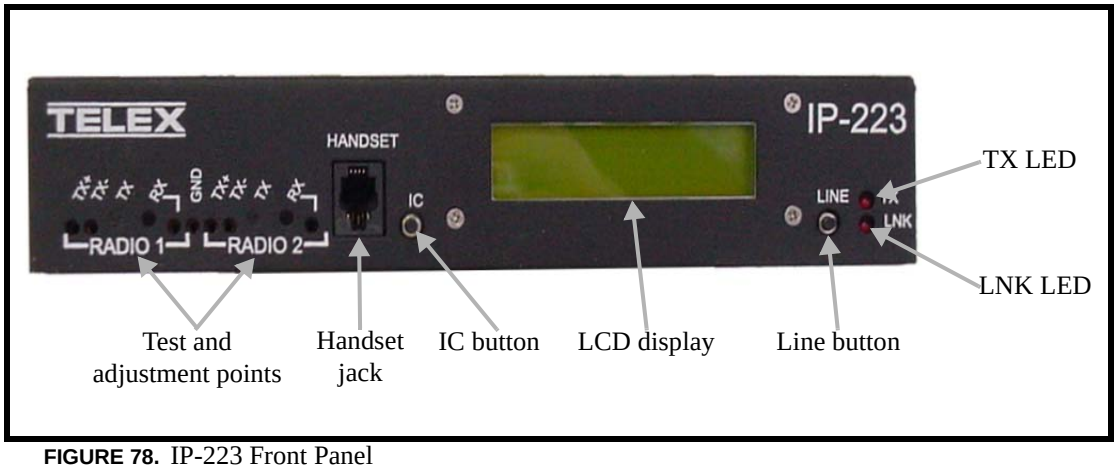

FIGURE 78. IP-223 Front Panel

Test and Adjustment Points

Test and adjustment points for **Radio 1** and **Radio 2** are provided on the front panel. Newer versions of the IP-223 provide access to additional test and adjustment points on the case top, as shown in Figure 79.

NOTE: Radio 1 and radio 2 are also referred to as line 1 and line 2 in this manual.

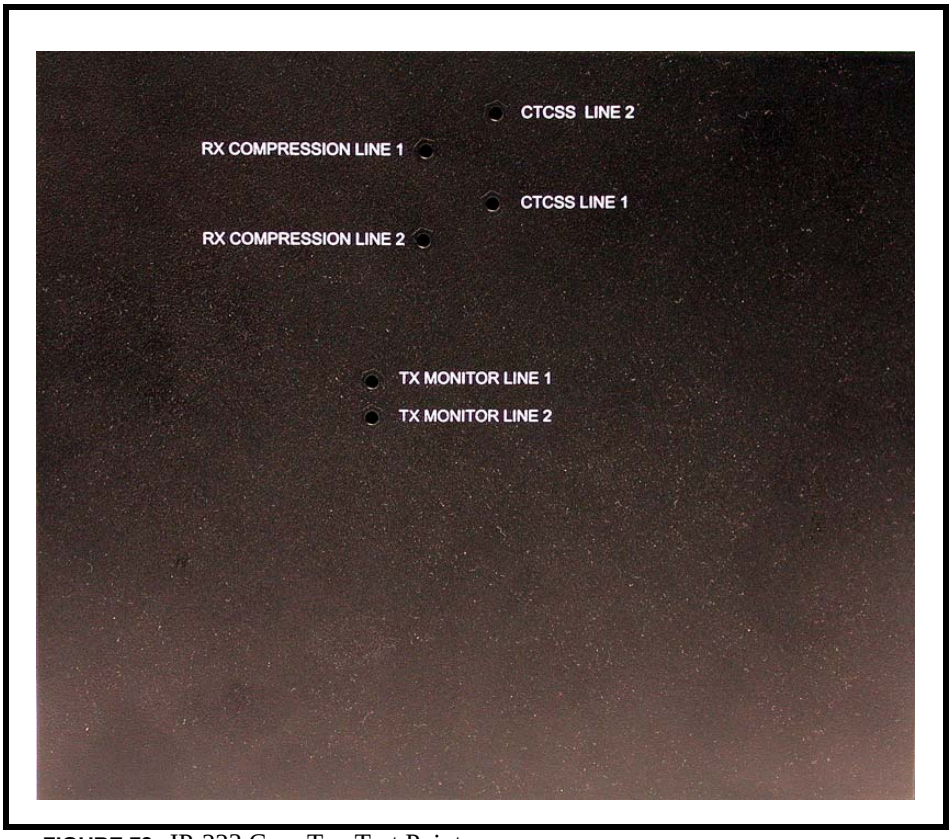

FIGURE 79. IP-223 Case Top Test Points

Handset Jack

An optional **handset** is available for the IP-223. When the optional handset is plugged into the handset jack, the ability to monitor and talk on either line is available. The handset jack is located on the front of the unit, see Figure 78. When the handset PTT switch is pressed, the selected radio connected to the IP-223 is keyed up on the existing frequency and the handset microphone audio is transmitted.

Ethernet audio is also generated on the TX multicast and port for the selected line. This functionality can be used to test both the Ethernet network and the analog connection.

IC Button

The **IC** button, when pressed, sends audio from the handset microphone back through the IP Network on the selected TX multicast and port. It also sends audio to the transmit lines of the IP-223 without keying up the radio. This means no PTT relay in local mode and no **EIA** (Electronic Industries Association) tones in tone mode.

NOTE: A handset is required to use the IC button.

LCD Display

The **LCD** display provides panel status information, such as the IP and subnet addresses, line status, and handset line selection.

- TX F# (# is the selected function tone) indicates a PTT is active.
- RX F# (# is the selected function tone) indicates the RX radio is active.
- ID # displays when a Fleetsync or MDC ANI ID is decoded. This does not include serial decoding.

- When connected to a serially controlled radio, iDEN, Sepura, Kenwood or Johnson displays.
- INTCOM displays when the front panel IC button is pressed.
- EnetIC displays when the console generated intercom is received.
- CTX F# displays when the console mode IP-223 decodes tones from a tone console in Console mode.
- CRX F# displays when the IP-223 transmits wire-line audio to a legacy tone console in Console mode.
- PTX F# displays when the IP-223 decodes tones from a legacy tone console attached in parallel in Tone mode.
- CPT F# displays when the IP-223 transmits to a line if the line-to-line crosspatch is enabled.
- Ring displays when there is an incoming phone call in Phone mode.
- Offhook displays when the line is in use during a phone call.
- LLM displays when no phone line is connected to the PIB or TDI in Phone mode.
- NO LINE ENABLED displays after power-up if neither line is enabled.
- Scan List.... displays during power up while the IP-223 is communicating with serial controlled radios that support the Scan List feature.

To **toggle the LCD display**, do the following:

1. Press and hold the **line button** and then momentarily press the **IC button**.
   Three different displays are available with each press of the IC button:
   - While pressing the line button, press the **IC button** once.
     The IP Address and Mask Address of the unit displays.
   - Continue to hold the line button, then press the **IC button** a second time.
     The TX alignment tones are turned ON.
   - Continue to hold the line button, then press the **IC button** a third time.
     The RX VU meter displays.
2. Press the **IC button** a fourth time to clear the display and return to the normal LCD display.
3. Release the **line button**.

Line Button

The **Line** button is used to select which radio, or line, the handset audio is routed and which line is being monitored. The handset line selection is displayed as an asterisk (*) in the right most column of the LCD display. An asterisk (*) on the top line of the display indicates a connection to line 1, and an asterisk (*) on the bottom line of the display indicates a connection to line 2.

TX LED

The **TX LED** provides a visual indication the IP-223 is generating IP packets. When the LED is illuminated, packets are being transmitted to the network.

LNK LED

The **LNK LED** provides a visual indication of the Ethernet connection. When the LED is illuminated, a valid network connection is established.

Back Panel

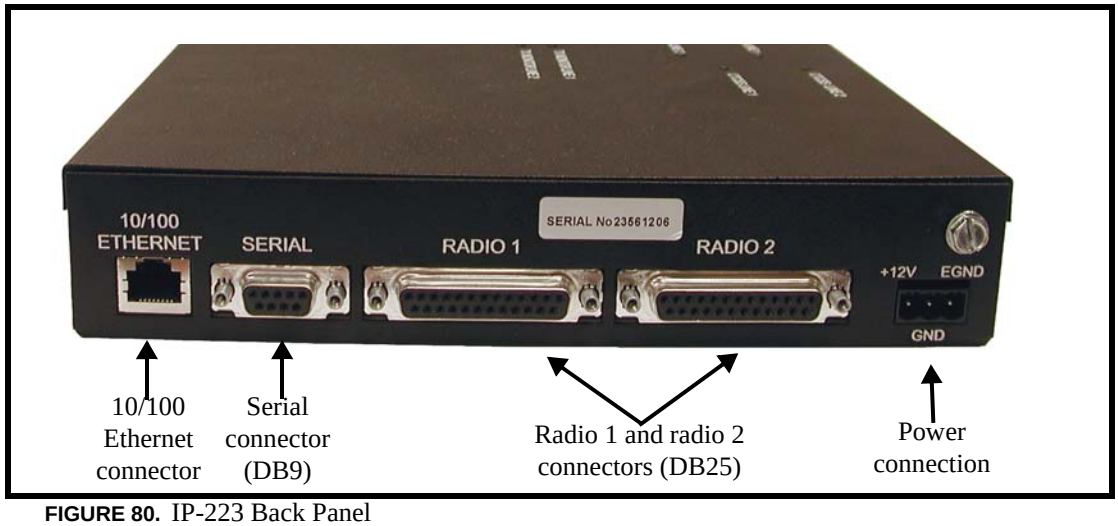

FIGURE 80. IP-223 Back Panel

10/100 Ethernet Connector

The **10/100 Ethernet** connector provides the LAN or WAN connection for the IP-223.

Serial Connector

The **serial** connector (DB9) is used for either of the following:

- To program an initial IP Address into the IP-223 unit, if the IP Address cannot be programmed through the Ethernet port on the installed system.

NOTE: To communicate with HyperTerminal, the jumper setting must be RS-232.

- To provide serial communication to various radios. Both radio (or line) 1 and radio (or line) 2 are supported on this connector, with the appropriate splitter cable.

NOTE: You must adjust the position of the jumper, on J35 when using line 1, or on J26 when using line 2, according to the serial connection type for the radio interface shown below. See “Jumper Positions” on page 25 for more information.

Jumper position	Connection type
A	RS-232
B	TTL

TABLE 2. Jumper Position

SERIAL DB9 PINOUT		
SIGNAL	**LINE #**	**DB9 PIN #**
TX 232	1	2
RX 232	1	3
TX TTL	1	9
RX TTL	1	1
Ground	both	5
TX 232	2	8
RX 232	2	7
TX TTL	2	4
RX TTL	2	6

TABLE 3. DB9 Pinout

Radio 1 and Radio 2 (Line 1 and Line 2) Connectors

Two (2) **DB25** connectors are provided for connection to various audio devices. The pinouts shown in Table 4 are used when custom cables need to be fabricated.

Power Connection

The IP-223 requires +12 to +16VDC, ~700mA of clean power. A 3-pin screw terminal receptacle is provided on the right rear of the unit, pin 1 is the positive terminal, pin 2 is the ground terminal, and pin 3 is the earth ground terminal.

As with all communication equipment earth ground should be used. Earth ground is a low impedance path to earth for the purpose of discharging lightening, static, and radiated energy.

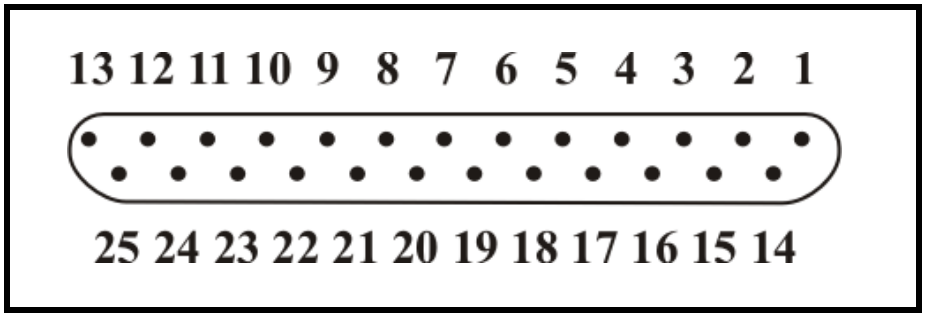

FIGURE 81. DB25 Connector Pinout Configuration

TABLE 4. DB25 Connector Pinout Connections

Pin #	Signal	Cable color
1	PTT Relay N.C.	Brown
2	PTT Relay Common	Red
3	MON Relay N.O.	Orange
4	R1 Relay N.C.	Pink
5	R1 Relay Common	Yellow
6	R2 Relay N.O.	Green
7	Ground	Lt. Green
8	Digital 0/X-Mute	Blue
9	Digital 2	Violet
10	Digital 4	Gray
11	CTCSS	White
12	Radio RX- in / 4-wire RX	Black
13	Radio TX- out / 4-wire TX or 2-wire	Brown/White
14	PTT Relay N.O.	Red/White
15	MON Relay N.C.	Red/Black
16	MON Relay Common	Orange/White
17	R1 Relay N.O.	Orange/Black
18	R2 Relay N.C.	Pink/Black
19	R2 Relay Common	Yellow/Black
20	Digital 6/COR	Green/White
21	Digital 1/Supervisory	Green/Black
22	Digital 3	Blue/White
23	Digital 5/Local PTT	Violet/White
24	Radio RX+ input / 4-wire RX	Gray/Black
25	Radio TX+ out / 4-wire TX or 2-wire	Black/White
Shield	Ground	

CHAPTER 2

Communications System Design

Designing an IP-223 system requires an understanding of the radio network and how the various radios and communication equipment are connected.

The first step in designing an IP-223 system is to create a roadmap of the radio, console, and any other communication equipment locations. This roadmap must include the following:

- Multicast addresses for each channel of **TX** (transmit) and **RX** (receive) communication.
- Port numbers for each channel of TX and RX communication.
- Base IP Addresses assigned to each console and IP-223 on the network.

Network Requirements

Bandwidth

Each VoIP channel requires 50kBit of bandwidth while active. **Full-duplex** conversation (audio in each direction) requires 100kBit of bandwidth.

NOTE: Most radio voice communications are **half-duplex** (only in one direction at any one time), thus requiring 50kbits.

Some radio systems transmit *go-ahead* beeps when it is clear to talk. In order for the console operator to hear the beeps, the system must support full-duplex communication. Full-duplex bandwidth may only be required for the first few seconds of a conversation, due to the brief nature of the *go-ahead* beeps at the beginning of the transmission.

When using a PIB, TDI, C-6200, or the NI-223 for a telephone connection, 100kBit is required since it is a constant, full-duplex conversation.

Multicast

In general, Telex systems require **multicast** to function. The network must be able to support the multicast traffic generated by the system.

It is very common for networks to enable multicast after an **IGMP** (Internet Group Management Protocol) join message is sent out, and then prune off branches after a period of time. Due to the intermittent usage patterns of two-way radios, such a system can appear to work flawlessly for a period of time, then no longer work.

NOTE: When using Cisco technology, **IP PIM dense mode** is generally recommended. Generally speaking, **sparse-dense-mode** can also be implemented effectively. We recommend explicitly joining the multicast group with an **IP IGMP static-join X.X.X.X command**. For more information on Cisco and IGMP, visit www.cisco.com

Internet Group Management Protocol (IGMP)

IGMP can be used to control where multicast is allowed to propagate. When a console on the subnet is expected to be continually operational, multicast must be active for that subnet at all times.

Network Performance

Networks should perform well under any loading conditions. The default audio delay is 120ms, plus any delay added by the network. While delay alone does not cause issues, **variable delay (jitter)** does. Jitter in a network cannot exceed the maximum packet buffer of any individual product buffer. Refer to the individual product manuals for these specifications. For example, the IP-223 can handle approximately 600ms of network jitter.

NOTE: Losing more than 5% of the total packets transmitted compromises audio quality and system performance. Optimally, packet loss should be less than 1%.

Local/Radio Connections

NOTE: Connections to radios differ from connections for remote operation; therefore connections are discussed separately.

Jumper Positions

An example of the **jumper positions** are shown in Figure 82. In the figure, jumper 14 (J14) is shown in position A, jumper 3 (J3) is shown in position B, and jumper 23 (J23) has been placed on the center pin indicating the jumper is in the NULL position.

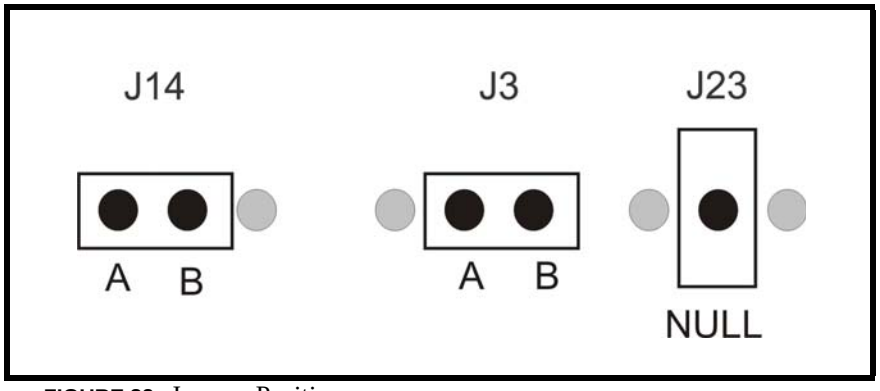

FIGURE 82. Jumper Positions

To **adjust the position of a jumper**, do the following:

1. Remove **power** from the IP-223 unit.

CAUTION: Failure to remove power may cause damage to the IP-223.

2. Remove the **six (6) screws** from the case top.

3. Carefully slide the **case top** forward past the IC and LINE buttons, and then lift up to gain access to the **PCB** (Printed Circuit Board) as shown in Figure 83.

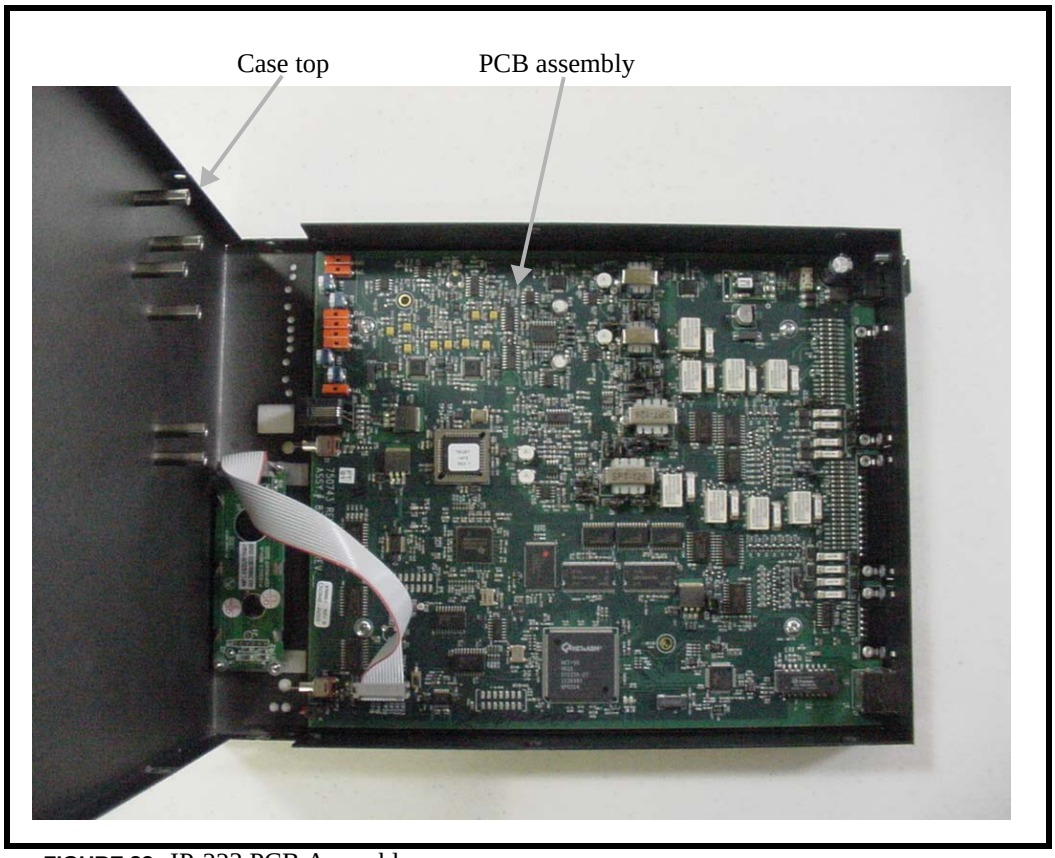

FIGURE 83. IP-223 PCB Assembly

4. Locate the **desired jumper** on the PCB assembly and use needle nose pliers to adjust the **jumper**, if necessary.
5. Carefully lift up the **case top** and place it into position on the chassis bottom.
6. Secure the **case top** into position using the six (6) screws.
7. Connect **power** to the IP-223 unit.

TX Audio Connection

The IP-223 has a number of options when **connecting** to the radio. Different jumper settings are required for different revisions of the PCB installed in the IP-223 unit, and are noted below. Set the jumper position listed for the line according to the connection type shown below.

If the radio transmit audio output is balanced,

- connect to pins 13 and 25 of the DB25 connector.

If the transmit audio is single ended,

- use pin 25 of the DB25 connector.

NOTE: Shielded cable is recommended.

PCB 750743 or PCB 750630 revision C and higher

Line 1 jumpers: J3, J9, and J11

Line 2 jumpers: J25, J28, and J29

Jumper Position	Connection Type
A	Single Ended Low-Impedence
B	Balanced 600 ohm

RX Audio Connection

To connect the **radio receiver audio** to the IP-223, different jumper settings are required for different revisions of the PCB installed in the IP-223 unit, and are noted below. Set the jumper position for the line according to the connection type shown below.

- If the radio receiver audio output is balanced, connect to pins 12 and 24 of the DB25 connector.
- If the receiver audio is single ended, use pin 24 of the DB25 connector. The audio source must be after the squelch circuit to prevent sending continuous noise to the remote console.
- If a high-impedance point in the receiver is used, a shielded cable is recommended.

PCB 750743 or PCB 750630 revision C and higher

Line 1 jumpers: J16 and J21

Line 2 jumpers: J19 and J20

Jumper Position	Connection Type
A	Single Ended Low-Impedence
B	Balanced 600 ohm

	Jumper Position	
	Line 1	**Line 2**
Receive Input Impedance:	**J14**	**J24**
8 ohms (for a speaker input)	B	B
600 ohm	A	A
10k ohm	NULL	NULL

NOTE: When the speaker output is used, the radio volume control affects the audio levels of the IP-223.

	Jumper Position			
	Line 1		**Line 2**	
Receive Input Impedance:	**J14**	**J23**	**J17**	**J24**
8 ohms (for a speaker input)	B	A	A	B
600 ohm	A	B	B	A
10k ohm	B	B	B	B

COR (Carrier Operated Relay) I/O (Input/Output)

The **COR I/O** connection indicates that audio is being received from the radio. The COR connection is provided at DIG6, pin 20 of the DB25 connector.

PTT Connection

Connect the radio **PTT** circuit to the PTT relay contact terminals on the DB25 connector. Usually the common of the relay contact switch is grounded and the normally open contact connects to the PTT input. An alternative method to ground the common of the relay internal to the unit is to jumper R377 (line 1) and R381 (line 2) with a piece of wire soldered closed.

Monitor Connection

Connect the radio **MON** circuit to the MON relay contact terminals on the DB25 connector. Usually the common of each relay contact switch is grounded and the normally open contact connects to the MON input. An alternative method to ground the common of the relay internal to the unit is to jumper R376 (line 1) and R380 (line 2) with a piece of wire soldered closed.

R1 and R2 Relays

The IP-223 provides two (2) **relay closures** for controlling the frequency of the radio, or switching a remote ancillary device. The F1 and F2 contacts can be connected through the DB25 connector. Usually the common of each relay contact switch is grounded and the normally open contact connects to the radio frequency control terminals. Information on programming the R1 and R2 relays is provided in the “Setup Information” chapter of this manual starting on page 33. An alternative method to ground the common of the relay R1 internal to the unit is to jumper R375 (line 1) and R379 (line 2), and for relay R2 jumper R374 (line 1) and R378 (line 2) with a piece of wire soldered closed.

Digital I/O

In addition to the two standard relay closures, seven (7) lines of **digital I/O** are also included. These lines are open-collector transistor outputs. They can be programmed on a per line basis to generate any of 128 combinations. They pull down to ground and can be jumper selected to pull up to either +5V or the power supply voltage (minimum +12V).

Jumpers J8 (line 1) and J30 (line 2) are used to select the pull up voltage. Jumper position A pulls up to +5V and jumper position B pulls to the power supply value.

NOTE: Some radios provide a pull-up voltage. When this occurs, place the jumper into the null position. Information on programming the digital I/O lines is provided in the "Setup Information" chapter of this manual starting on page 33.

CTCSS (Continuous Tone Coded Squelch System) Connection

The IP-223 connection can be used for a recorder output or as a **CTCSS** output:

Recorder output - The analog audio is generated at the connection.

CTCSS output - Each function tone can be assigned a CTCSS number which corresponds to a CTCSS frequency. See "CTCSS Tone Frequency Table" on page 131.

Tone/Console Operation

Tone and Console operation require jumpers set to specific locations. The following section discusses the jumper settings. See "Jumper Locations" on page 125.

2-/4-Wire Jumper Settings

2-Wire / 4-Wire Selection:	Line 1	Line 2
2-Wire A position	J33 and J34	J5 and J6
4-Wire B position	J33 and J34	J5 and J6

The RX termination J14 (line 1) and J24 (line 2) should be placed in jumper position A on 4-wire systems for a single unit at the end of a line. If multiple units are connected in parallel, only one (1) unit should have the RX termination jumper in the A position. The RX termination jumper should be in the null position on the rest of the units.

For 2-wire operation:

- **PCB 750743 or PCB 750630 revision C and higher** - Set J14 or J24 to the NULL position.

TX Side Settings

PCB 750743 or PCB 750630 revision C and higher

Two (2) jumpers on the transmit pair allow a degree of control over the output impedance. The jumper positions for each line, depending on how many consoles are placed in parallel, are shown below.

NOTE: PCB 750630 revision A does not have these jumpers.

Jumper Position					
	Line 1		Line 2		
Consoles in Parallel:	**J17**	**J22**	**J10**	**J15**	**Output Impedance**
1	B	B	B	B	600 ohms
2	A	B	A	B	1200 ohms
3	B	A	B	A	1800 ohms
4	A	A	A	A	2400 ohms

Local PTT I/O

The **Local PTT I/O** is used to generate TX Ethernet traffic on a local keyed system as opposed to the 2175Hz detection on a tone keyed system. The input is at DIG5; pin 23 of the DB25 connector. The TX condition is caused by an active low.

Cross Mute I/O

Cross mute information to local consoles is provided at DIG0, pin 8 of the DB25 connector.

Supervisory I/O

Supervisory information to and from consoles is provided at DIG1, pin 21 of the DB25 connector. The supervisory I/O is both an input and an output.

Supervisory input and output in console, tone or local mode behaves as follows:

Console Mode – Input - An Ethernet packet supervisor is sent on detection.
Output - When an Ethernet packet is received. The line level is set.
While under supervisory control, TX traffic from the Ethernet to the console is muted. The console's audio to the Ethernet is muted. Handset PTT and the IC button are disabled.

Tone Mode – Input - An Ethernet packet supervisor is sent on detection.
Output - When an Ethernet packet is received, the line level is set.
When an Ethernet packet is received, the line level is set.

Local Mode - Input- No affect on I/O.
Output - No affect, when Ethernet packet is received.
While under control, manual PTT and the IC button are disabled.

NOTE: Information on programming the supervisory I/O is provided in the "Setup Information" chapter of this manual starting on page 33..

Level Adjustments

Once the IP-223 unit is connected to the system, the level potentiometers can be set. Access to test and adjustment points on newer versions of the IP-223 are provided through labeled openings on the case top and on the front panel of the unit. On older versions of the IP-223, access to some of the test and adjustment points is provided through labeled openings on the front panel; however, the case top needs to be opened to access the other test and adjustment points.

General Alignment

The IP-223 has a TX alignment tone and an RX alignment VU meter accessible from the front panel of the unit.

- Press and hold the **line button** and then momentarily press the **IC button** twice to generate the 1kHz 0dB TX alignment tone on both lines.
- Press and hold the **line button** and then momentarily press the **IC button** three times to display the RX VU meters.

Radio/Line TX Level

The **Radio 1 TX** test points (TP2 and TP6) and the **Radio 2 TX** test points (TP8 and TP9) are located on the front panel of the IP-223. These provide a point to measure the actual signal being placed into the radio or balanced TX line. The front panel accessible adjustment Radio 1 TX potentiometer (R47) and Radio 2 RX potentiometer (R61) are used to adjust these levels.

NOTE: If the unit is placed into single-ended mode, the radio TX+ should be measured with respect to ground.

It is also possible to place jumper J9 (line 1) or J26 (line 2) into the *A* position to decrease the output of the TX line by a factor of 10. The final adjustment should allow for undistorted audio to be transmitted for the full range of transmission levels at the desired deviation. This can be accomplished by turning on the TX alignment tone and adjusting the TX output to 0dB, as measured into a 600 ohm load.

Radio/Line RX Level

Standard Alignment Procedure for a 2- or 4- wire System:

- Inject a 0dBm test tone on the RX pair (4-wire pins 12 and 24: 2-wire pins 13 and 25).
- Measure the RX level on test point TP13 for line 1 or TP1 for line 2.
- Adjust potentiometer R175 for line 1 or potentiometer R110 for line 2 until 0dBm is measured between the test point and GND. (*0dBM = 2VPP = .707VRMS*)
- Detune slightly 1-2dBm to provide overhead for large transients.
- **AGC** (Automatic Gain Control) compression potentiometers RV5 for line 1 and RV1 for line 2 control the aggressiveness of the AGC circuitry, if enabled. The AGC can be used to enhance the gain capabilities of the RX circuitry. Set RV5/RV1 fully clockwise and, if required, back off 10 to15 degrees maximum.
- Use the RX alignment tool (VU meter) accessed through the LCD display (*press and hold the line button and then momentarily press the IC button 3 times*) to verify the dBm level. The reading should be 0dBm with the AGC turned off. If the AGC is ON, it is likely the RX alignment software always displays *0dBm*, the targeted level for the AGC circuitry.

Line TX Monitor Level (Tone and Console Mode only)

PCB 750743 or PCB 750630 revision C and higher

The **Line TX Monitor Level** adjustment is used when the IP-223 is connected to consoles set in 4-wire mode. This allows for local TX audio to be sent back on the Ethernet and played at other consoles so both sides of the radio traffic can be heard. The alignment for TX monitor is similar to 4-wire RX alignment.

To **adjust the TX monitor**, do the following:

1. In the options section of the Per Line Setup window, select the **TX Monitor**.

   NOTE: If this feature is not necessary, or the line is in 2-wire mode, the TX Monitor field in the Options section on the Per Line Setup window should be cleared.

2. Verify the **RX alignment is completed first**.

To perform a standard alignment for a 4-wire system, do the following:

1. Transmit a ***0dBm* test tone** on the TX audio pairs pins 13 and 25.
2. Measure the **RX level** on test point TP13 for line 1 or TP1 for line 2.
3. Adjust **potentiometer R390 for line 1 or potentiometer R391 for line 2** until 0dBm is measured between the test point and GND. (*0dBM = 2VPP = .707VRMS*).

   NOTE: Do not adjust the RX potentiometers.

4. Use the RX alignment tool (VU meter) accessed through the LCD display (*press and hold the line button and then momentarily press the IC button 3 times*) to verify **the dBm level**.

CTCSS Level

The **CTCSS level** is measured by connecting an oscilloscope or RMS meter to ground and Radio 1 CTCSS test point (TP7) or Radio 2 CTCSS test point (TP10). With the radio connected to the CTCSS output, have the remote console open to receive audio so CTCSS is present. Adjust the Radio 1 CTCSS potentiometer (R50) or Radio 2 CTCSS potentiometer (R53) until the desired level is achieved.

Frequency Decoding

The IP-223 is factory tuned to the **frequencies** shown below. The detection frequencies cannot be changed as they are coded into the software. However, any actual function or output can be made to work with any existing programmed frequency. Please consult the factory for special requirements for frequency selections.

Guard tone/PTT Tone: 2175 Hz

MON Function Tone: 2050 Hz

Frequency Select Function Tones (where used)

F1: 1950 Hz	**F5**: 1550 Hz	**F9**: 1150 Hz	**F13**: 750 Hz
F2: 1850 Hz	**F6**: 1450 Hz	**F10**: 1050 Hz	**F14**: 650 Hz
F3: 1750 Hz	**F7**: 1350 Hz	**F11**: 950 Hz	**F15**: 550 Hz
F4: 1650 Hz	**F8**: 1250 Hz	**F12**: 850 Hz	**F16**: 450 Hz

CHAPTER 4

Setup Information

The setup information for the IP-223 is accessed by using a web browser, such as Microsoft® Internet Explorer. This section describes the programming information for the IP-223. It includes information on setting the IP Address, accessing the IP-223 web setup windows, the setup window standards, and an explanation of the fields on each window used to program the IP-223.

Setting the IP Address Information

Before entering the setup information for the IP-223, the **IP Address** and **Network Mask** must be assigned to the IP-223 by the use of a web browser or Windows™ HyperTerminal™ if the assigned IP Address is not accessible on your network. Contact your network administrator to obtain the network IP Address and Mask.

For the IP-223 to interface successfully with the LAN or WAN, the IP Addresses of the IP-223 and your PC must be on the same subnet. IP Addresses consist of four numbers separated by periods. For example, 10.2.99.101. For more information on IP Addresses and subnets, consult your network administrator.

In order for the PC and the IP-223 unit to communicate via IP, both devices need to be in the same subnet.

NOTE: For operation on different subnets, a gateway address must be configured.

An example of IP Addresses residing in the same subnet:

*PC IP Address:*10.2.99.250

*IP-223 IP Address:*10.2.99.251

IP-223 Network Mask:255.255.255.0

To **display the IP Address and Network Mask assigned to the IP-223**, do the following:

1. Connect **power** to the IP-223.
   The IP Address and subnet mask are displayed on the LCD momentarily upon power up.
2. To check the IP Address and subnet mask at any other time, press and hold the **line button** on the front panel of the IP-223, and then momentarily press the **IC button**.
   The IP Address is displayed on the top line of the LCD, and the Network Mask is displayed on the bottom line of the LCD.

Verify the IP Address and Network Mask obtained from your network administrator to the IP-223 addresses.

If the IP Address and Network Mask need to be set up using the serial port, see “Using HyperTerminal” below.

Using HyperTerminal

NOTE: J35 must be in the A position.

To **assign the IP Address and Network Mask using HyperTerminal**, do the following:

1. Connect the **IP-223** to your PC using a DB-9 serial cable.
2. From the Start menu on the computer, open the HyperTerminal Application, see Figure 84. (Start|Programs|Accessories|Communications|HyperTerminal).
   The HyperTerminal and Connection Description windows appear, see Figure 85.

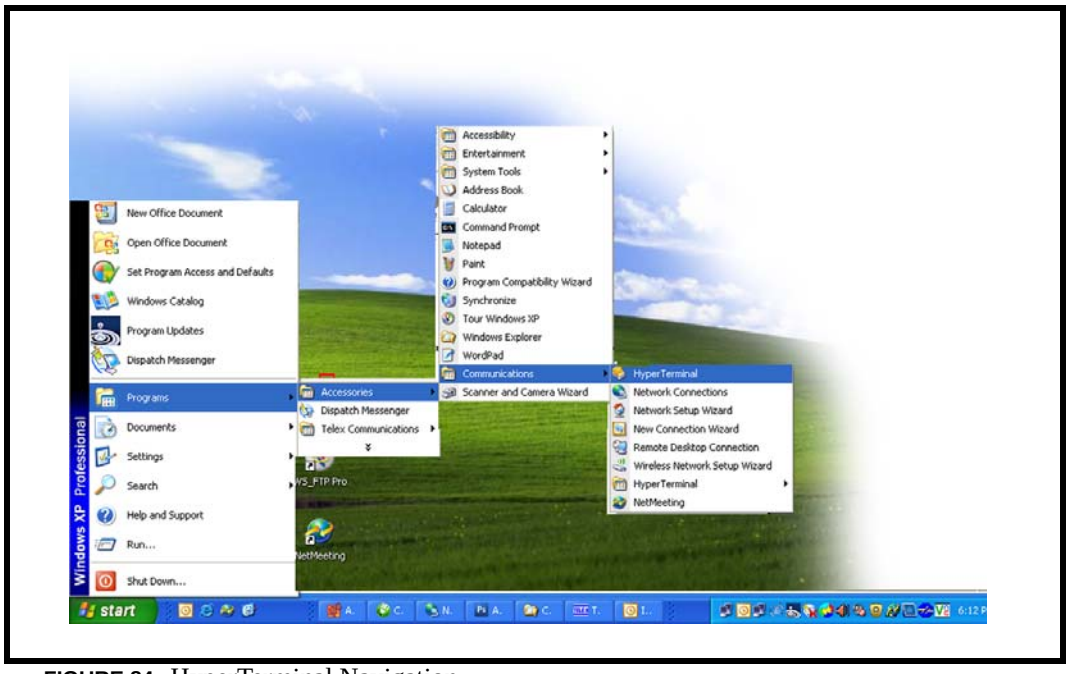

FIGURE 84. HyperTerminal Navigation

3. In the Name field, enter **com**.
4. Click **OK**.
   The Connect To window appears.
5. From the Connect Using drop down menu, select **COM1**.
6. Click **OK**.
   The Com1 Properties window appears.
7. From the Bits per second drop down menu, select **19200**.

8. From the Flow Control drop down menu, select **None**

NOTE: These parameters may be different than the defaults depending on the selected Serial Port Parameters, see "Serial Port Parameters Drop Down Menu" on page 73.

Drop down menu	Default Setting
Bits per second field:	19200
Data bits field:	8
Parity field:	None
Stop bits field:	1
Flow control field:	None

9. Click **OK**.
The Main HyperTerminal window appears.

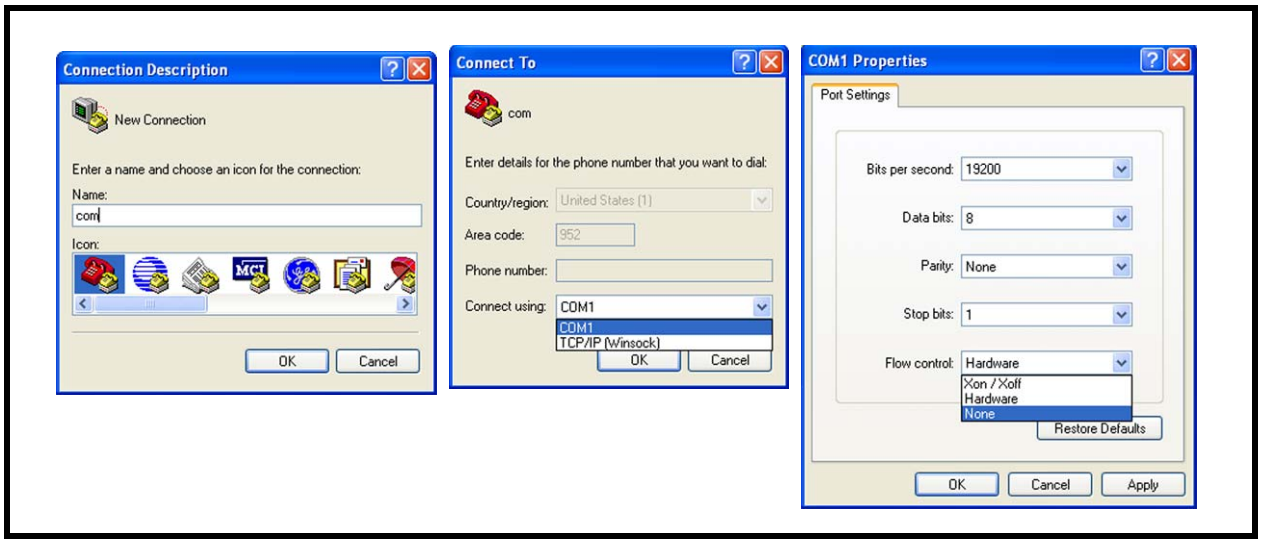

FIGURE 85. Com Terminal Setup Windows

10. In the main **HyperTerminal window**, enter an uppercase **S.**

11. Press **ENTER**.
Enter Password for Factory Setup appears.

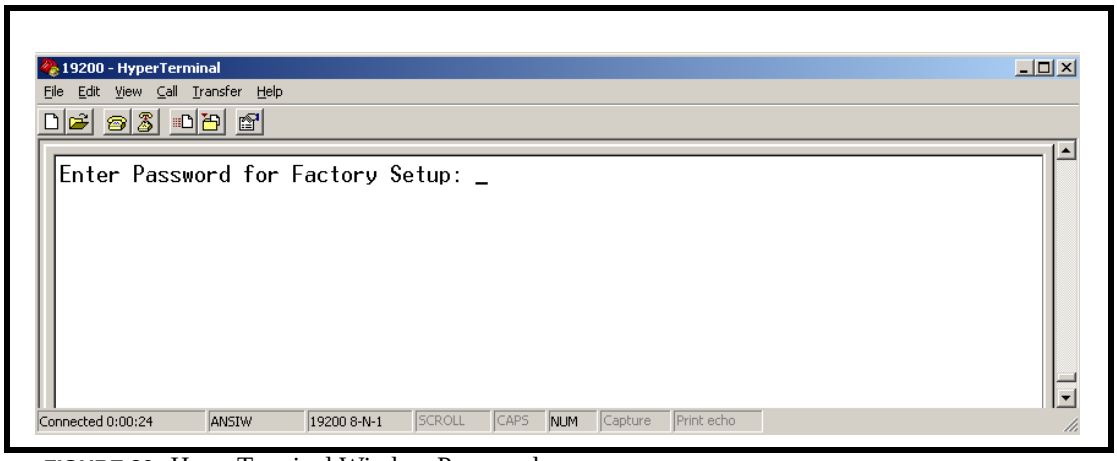

FIGURE 86. HyperTerminal Window Password

12. Enter **technobabble** for the factory setup password.

13. Press **ENTER**.
The serial port access window shown in Figure 87 appears.

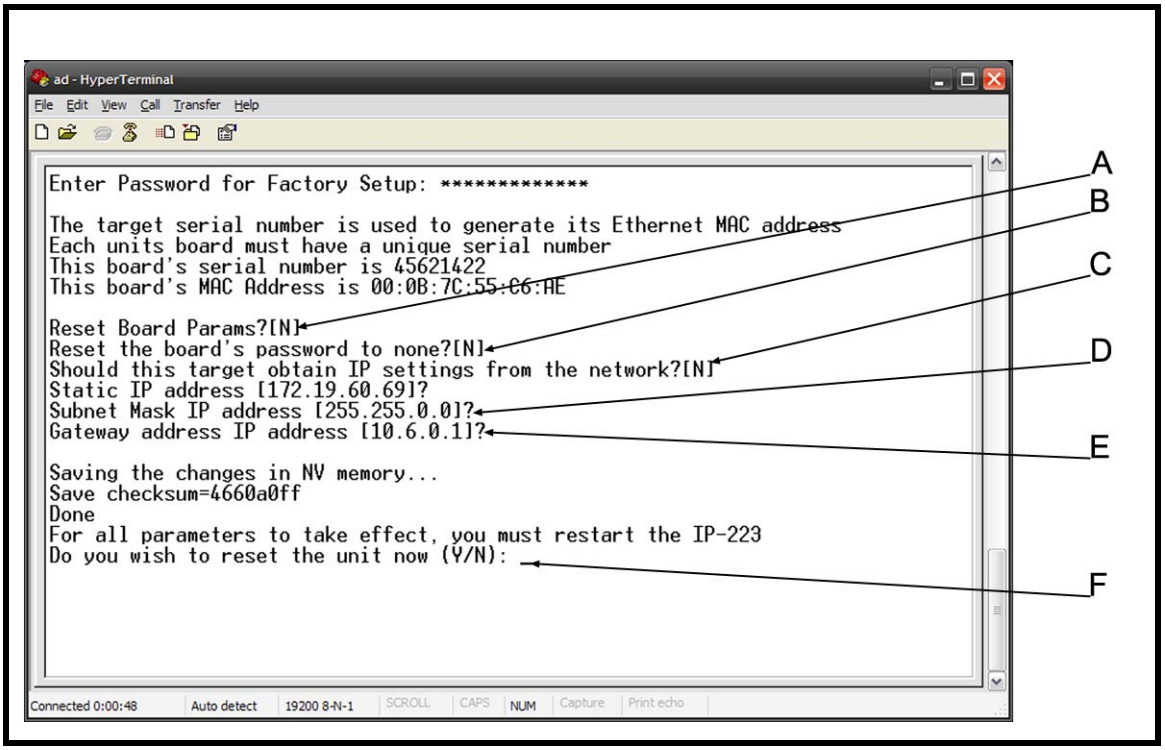

FIGURE 87. HyperTerminal Factory Setup Options – Serial Port Access Window

NOTE: The serial number is fixed and should match the case label. The **MAC** (Media Access Control) address is generated based on the serial number.

The following is a brief explanation of the factory setup options shown in Figure 87:

A - Provides the ability to reset the unit.

B - Allows access to the password if it is new or forgotten.

C - Allows the unit to get an IP Address via DHCP, or to manually set the IP Address.

D - Allows the Subnet Mask to be manually entered or changed.

E - Allows the Gateway Address to be manually entered or changed.

F - Provides the ability to reset (back to defaults) the Board Parameters.

14. When Reset the Board's password to None appears, type **Y** to reset the board's password number to none, otherwise, type **N**.
15. Press **Enter**.
16. When Should this target obtain IP settings from the network appears, type **Y** to obtain the IP settings from the network, otherwise, type **N**.
17. Press **Enter**.
18. When Static IP Address appears, enter the **IP Address** of the IP-223, if necessary.
19. Press **Enter**.
20. When Subnet Mask IP Address appears, enter the **Subnet Mask** IP Address, if necessary.
21. Press **Enter**.
22. When Gateway address IP Address appears, enter the **Gateway** IP Address, if necessary.
23. Press **Enter**.
24. When Reset Board Params appears, type **Y** to reset the board parameters, otherwise type **N**.
25. Press **Enter**.
26. When "Do you wish to reset the unit now" appears, type **Y** if changes were made on the window, otherwise enter an **N**.
27. If changes were made on the window, press **ENTER** to reset the IP-223, otherwise proceed to the next step.
    The changes made are saved to memory.
28. Close the **HyperTerminal program**.

Accessing IP-223 Web Browser Configuration Windows

Before connecting the IP-223 to the web browser, an IP Address compatible with an existing network must be set. Details on setting the IP Address and Network Mask are described earlier in “Setting the IP Address Information” on page 33.

The configured IP Address is the web browser address (http://XXX.XXX.XXX.XXX, the XXX’s refer to the values for the assigned IP Address) used to access the IP-223 Web Setup windows.

To **access the IP-223 web setup windows**, do the following:

1. Open the **web browser** on the PC.
2. In the web address bar, enter the **IP Address** of the IP-223.
   The Connect to [IP Address] window shown in Figure 88 appears.

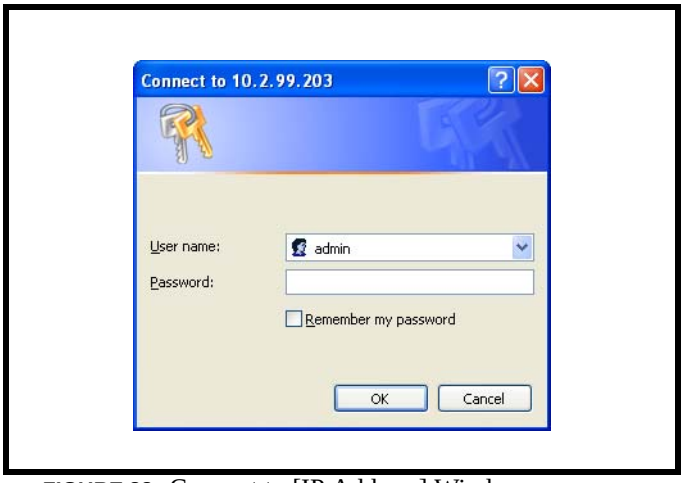

FIGURE 88. Connect to [IP Address] Window

3. From the User Name drop down menu, type ***admin*** or **the Username**.
4. In the Password field, enter the appropriate **Username password**.
   *If this is the first time the IP-223 has been started and a password has not been assigned to the unit, **no entry** is required*.
5. Click **OK**.
   The Welcome window appears.

IP-223 Web Setup Windows Standards

Links

Across the top of each setup window are **links** used to access the various IP-223 configuration pages. On the left side of the links header, the name assigned to the unit, the MAC address, and the version number of the firmware are displayed. A brief description of each link is provided below.

FIGURE 89. IP-223 Links

TABLE 5. IP-2002 Links

Link	Description
	Displays the “Welcome Window” on page 42.
	Displays the “Basic Ethernet Setup Window” on page 43.
	Displays the “General Gain Setup” on page 47.
	Displays the “Multicast Address Setup Window” on page 49.
	Displays the “Per Line Setup Window” on page 55.

TABLE 5. IP-2002 Links

	Displays the “Save to EEPROM Window” on page 90.
Account Setup	Displays the “Account Setup Window” on page 91.
Additional Feature	Displays the “Additional Feature Setup Window” on page 100.
Clone Console	Displays the “Clone Console Window” on page 101.
CRP Setup	Displays the “Crosspatch Setup Window” on page 102.
CRP PIN Table	Displays the “CRP PIN Table Window” on page 108.
Pass Change	Displays the “Pass Change Window” on page 111.
Tone Freq & Durations	Displays the “Tone Frequency & Durations Window” on page 112.

To **access a setup window**, do the following:

> Click the desired **link**.
The window for the selected link appears.

To **permanently save changes,** do the following:

1. Click **Submit**. 
The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 
The Save to EEPROM window opens.
3. Click **Save Parameters**. 
Changes are now permanently saved to the IP-223 console.

Welcome Window

The **Welcome** window provides a basic description of the IP-223 operating modes and a field to enter a descriptive name for the unit. This name is displays at the top of each IP-223 web setup window

NAVIGATION: Clicking the **picture of the IP-223** on the links displays the Welcome window, shown in Figure 90.

FIGURE 90. Welcome Window

To **change the name of the IP-223 unit**, do the following:

1. In the Console Name field, enter the desired **name** *(up to 12 characters)*.
2. Click **Submit**.
   The name appears at the top of the setup window.
3. From the links, select **Save to EEPROM**.
   The Save Setup Parameters window appears.
4. Click **Save Parameters**.
   The changes made are saved to permanent memory.

Basic Ethernet Setup Window

The **Basic Ethernet Setup** window is used to configure the IP-223 for use. The fields on this window are described on the following pages

NAVIGATION: Clicking **Basic Ethernet Setup** displays the Basic Ethernet Setup window, shown in Figure 91.

Serial Number Field

The **Serial Number** field displays the serial number of your IP-223. The serial number label is located on the back of the adapter box and should match the number in this field.

MAC Address

The **MAC Address** field displays the MAC Address of the IP-223.

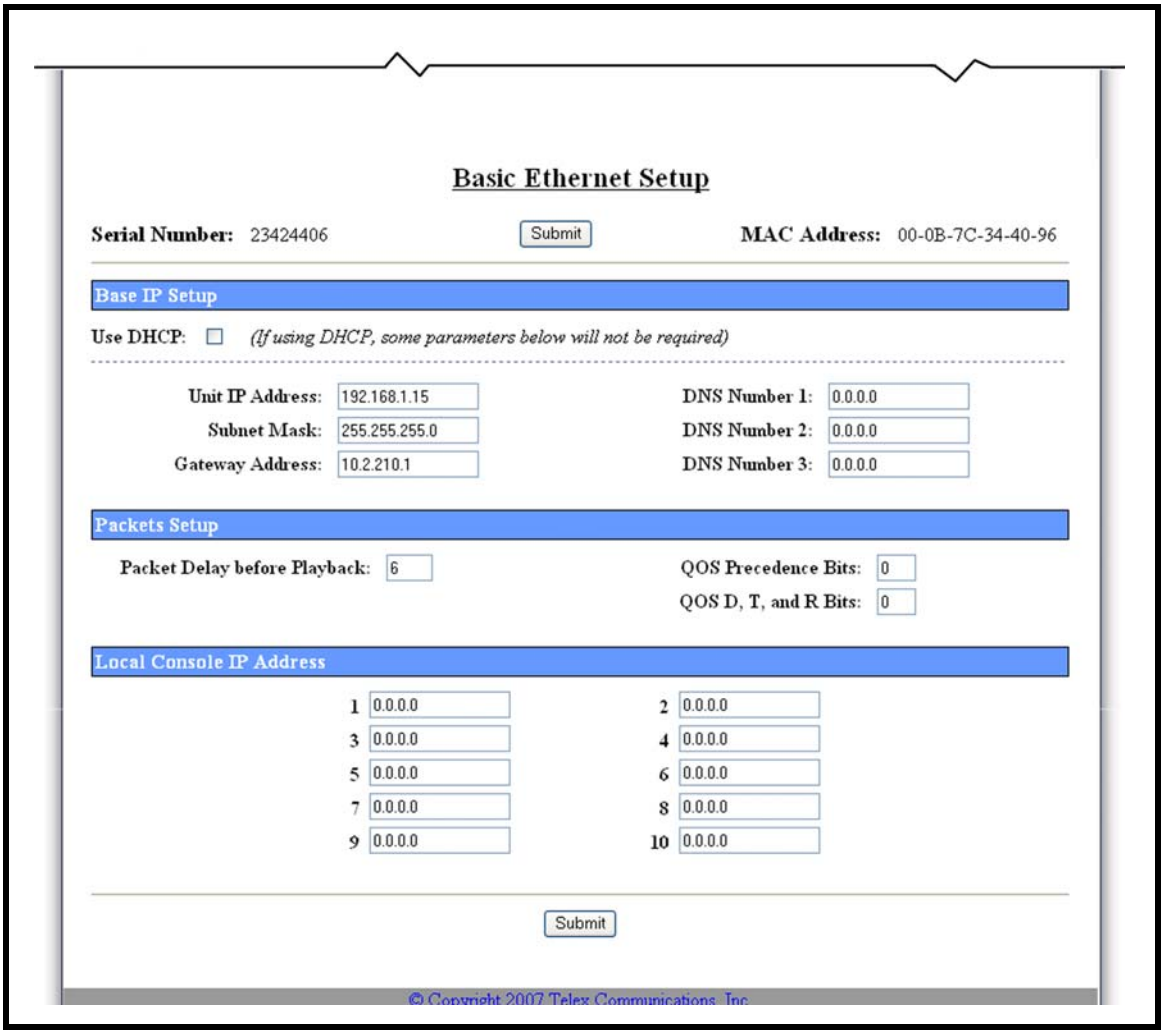

FIGURE 91. Basic Ethernet Setup Window

Base IP Setup

Use DHCP Server Check Box

The **Use DHCP Server** check box indicates whether or not **DHCP** (Dynamic Host Configuration Protocol) is used. If selected, DHCP allows the IP-223 to acquire all of the information for operation on the network bypassing its manual entry.

NOTE: Telex does not recommend operating with DHCP enabled. Operating with DHCP enabled may cause the base IP Address to change unexpectedly making changes to the software setup more difficult. If employing 5/6-tone selective calling and messaging, DHCP must not be used.

Unit IP Address Field

The **Unit IP Address** field identifies the unique base address assigned to the IP-223. This address identifies the unit for operations such as setup, software upgrades and communications in some operating modes.

Subnet Mask Field

The **Subnet Mask** field identifies information used by the IP stack to determine if an IP Address is local or if an IP Address requires the use of a gateway to be reached. Contact your network administrator to obtain the proper value for this field.

Gateway Address Field

The **Gateway Address** field identifies the IP Address of the node used to reach other networks. Contact your network administrator to obtain the proper value for this field.

DNS (Domain Name Server) Number 1–3 Fields

The **DNS Number 1–3** fields are currently not used by the IP-223.

Packet Setup

Packet Delay before Playback Field

The **Packet Delay before Playback** field identifies the length of delay before playback (jitter buffer). The IP-223 utilizes a 20ms **UDP/IP** (User Datagram Protocol/Internet Protocol) packet to encode audio. Some buffering of these packets must occur before playback to help absorb network delays, jitters, and lost packets. The typical entry for this field is 6, which translates to a delay of 120ms before playback (each packet is 20ms of audio). Larger values may be required for complicated networks, and smaller values for less complicated networks.

The range for this field is *4* to *29*.

QOS (Quality of Service): Precedence Bits Field

The **QOS: Precedence Bits** field is used to set the priority level of network traffic. Typically this value is left at 0 for normal traffic and 5 for voice traffic.

The range for this field is 0 to 7.

QOS: D, T, and R (Delay, Throughput, and Reliability) Bits Field

The **QOS: D, T and R Bits** field is used for advanced programming purposes. These bits are usually 0. Contact your network administrator to obtain the appropriate value for this field.

Delay (D)	an active delay bit tells the router to choose a high speed to minimize delay
Throughput (T)	an active throughput bit specifies high capacity links should be used.
Routing (R)	an active routing bit directs routing protocols and network management applications to select fault-tolerant paths.

For more information on the binary equivalent for delay, throughput, and reliability see Table 6 on page 45.

The range for this field is *0* to *7*.

TABLE 6. D, T, R Binary Reference

Precedence Field					D, T, and R bits				
Binary				Traffic Type	Binary				
0	0	0	(0)	Best Effort	D	T	R		
0	0	1	(1)	Background	0	0	0	(0)	Normal (Best Effort), minimal cost
0	1	0	(2)	Standard	0	0	1	(1)	Maximize Reliability
0	1	1	(3)	Excellent Load	0	1	0	(2)	Maximize Throughput
1	0	0	(4)	Controlled Load	1	0	0	(4)	Minimize Delay
1	0	1	(5)	Video					
1	1	0	(6)	Voice					
1	1	1	(7)	Network Control					

Local Console IP Address

Local Computer IP Address 1-10 Fields

The **Local Computer IP Address** fields identify the base IP Address of up to 10 IP-223 units within the same room. These fields are generally used when the selected line mode is console. The entries are used for the Ethernet crossmute function. The IP-223 examines the source of the audio and flags it if the source from one of the IP-223 units listed in these fields.

To **configure the IP-223 for use**, do the following:

1. From the links, select **Basic Ethernet Setup**.
   The Basic Ethernet Setup window appears.
2. In the Unit IP Address field, enter the **IP Address**.
3. In the Subnet Mask field, enter the **subnet mask address**.
4. In the Gateway Address field, enter the **gateway address**, if required.
5. In the Unit Name field, enter a **descriptive name**.
6. In the Packet Delay before Playback field, enter the **number of packets** of delay for playback *(each packet is 20ms of audio)*.
7. In the QOS: Precendence Bits field, enter the **number of bits**, if required.
8. In the QOS: D, T, and R Bits field, enter the **number of bits**, if required.
9. In the Local Computer IP Address fields, enter the **IP Addresses** of the IP-223 units that are located in the same room.
10. Click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
11. From the links, select **Save to EEPROM**.
    The Save Setup Parameters window appears.
12. Click **Save Parameters**.
    The entries are saved to permanent memory.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

IMPORTANT: The submit button saves changes in temporary memory only.

To **permanently save changes,** do the following:

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console

General Gain Setup

The **General Gain Setup** window provides for an up or down adjustment of the gain levels for various parameters included on the window. The IP-223 is based largely on software controlled resistors with a resolution of 1.5dB per step.

Example: If it is determined the output level for a transmission line is 3.0dB too high, an entry of -3.0dB should be entered in the corresponding Transmit Gain field for the line.

NAVIGATION: Clicking **General Gain Setup** displays the General Gain Setup window, shown in Figure 92.

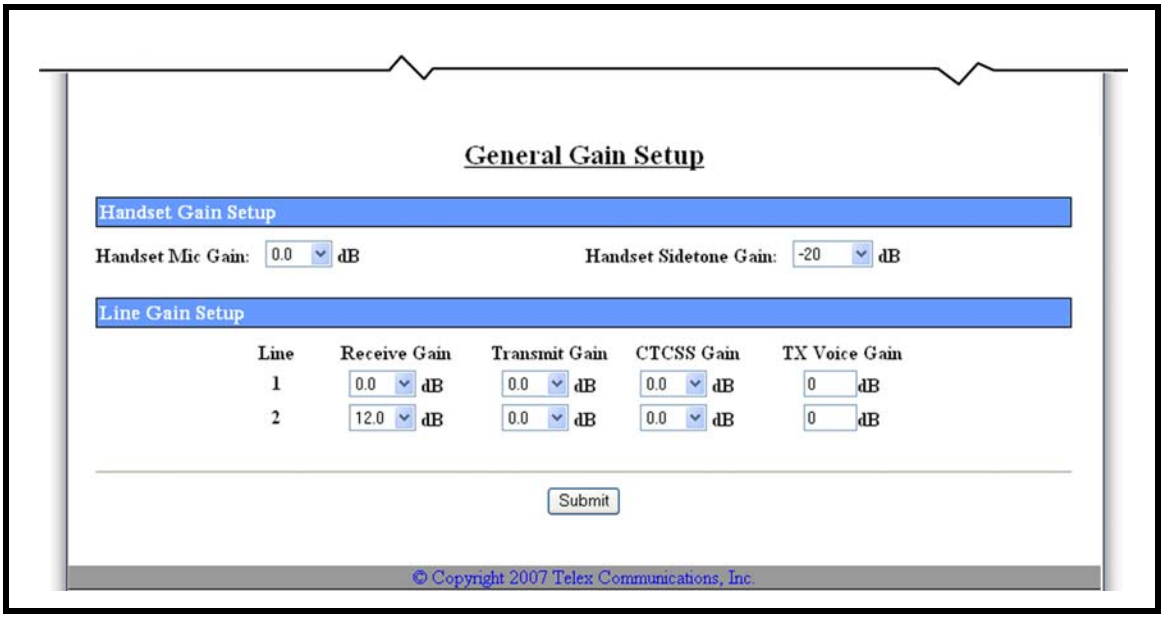

FIGURE 92. General Gain Setup Window

Handset Gain Setup

Handset Mic Gain Drop Down Menu

The **Handset Mic Gain** drop down menu identifies the level, in dB, of gain for the handset mic.

The values for this field are: *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10, -16, -22, -28, and -34*.

Handset Sidetone Gain Drop Down Menu

The **Handset Sidetone Gain** drop down menu identifies the sidetone gain level, in dB, for the handset.

The values for this field are: -12, -14, -16, -18, -20, -22, -24, and MUTE.

Line Gain Setup

Receive Gain Drop Down Menu

The **Receive Gain** drop down menu identifies the receive gain, in dB, for either line 1 or line 2.

The values for this field are: *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10, -16, -22, -28, and -34*.

Transmit Gain Drop Down Menu

The **Transmit Gain** drop down menu identifies the transmit gain, in dB, for either line 1 or line 2.

The values for this field are: *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10, -16, -22, -28, and -34.*

CTCSS Gain Drop Down Menu

The **CTCSS Gain** drop down menu identifies the CTCSS gain, in dB, for either line 1 or line 2.

The values for this field are: *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10, -16, -22, -28, and -34.*

TX Voice Gain Field

The **TX Voice Gain** field allows you to set the transmit voice gain, in dB, for either line 1 or line 2.

The range for this field is *10dB* to *-60dB*.

To **adjust a signal level**, do the following:

1. From the links, select **General Gain Setup**.
   The General Gain Setup window appears.
2. From the Handset Mic Gain drop down menu, select the **desired gain** for the handset mic.
3. From the Headset Sidetone drop down menu, select the **desired gain** for the headset sidetone.
4. From the Receive Gain drop down menu, select the **desired receive gain** for the appropriate line.
5. From the Transmit Gain drop down menu, select the **desired transmit gain** for the appropriate line.
6. From the CTCSS Gain drop down menu, select the **desired CTCSS gain** for the appropriate line.
7. In the Tx Voice Gain field, enter the **desired gain** for the appropriate, if required.
8. Click **Submit**.
   The entries currently displayed on the window are sent to the IP-223 for storage.
9. From the links, click **Save to EEPROM**.
   The Save Setup Parameters window appears.
10. Click **Save Parameters**.
    The entries are saved to permanent memory.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

IMPORTANT: The submit button saves changes in temporary memory only.

To **permanently save changes,** do the following:

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console

Multicast Address Setup Window

The **Multicast Address Setup** window identifies the mode of operation or line type, as well as which port the IP-223 uses to communicate various line information on. Once a selection is made in the line type field, the fields necessary to enter the setup information for the selected line type are enabled. The fields on this window are described on the following pages.

NAVIGATION: Clicking **Multicast Address Setup** displays the Multicast Port Number Setup window, shown in Figure 93.

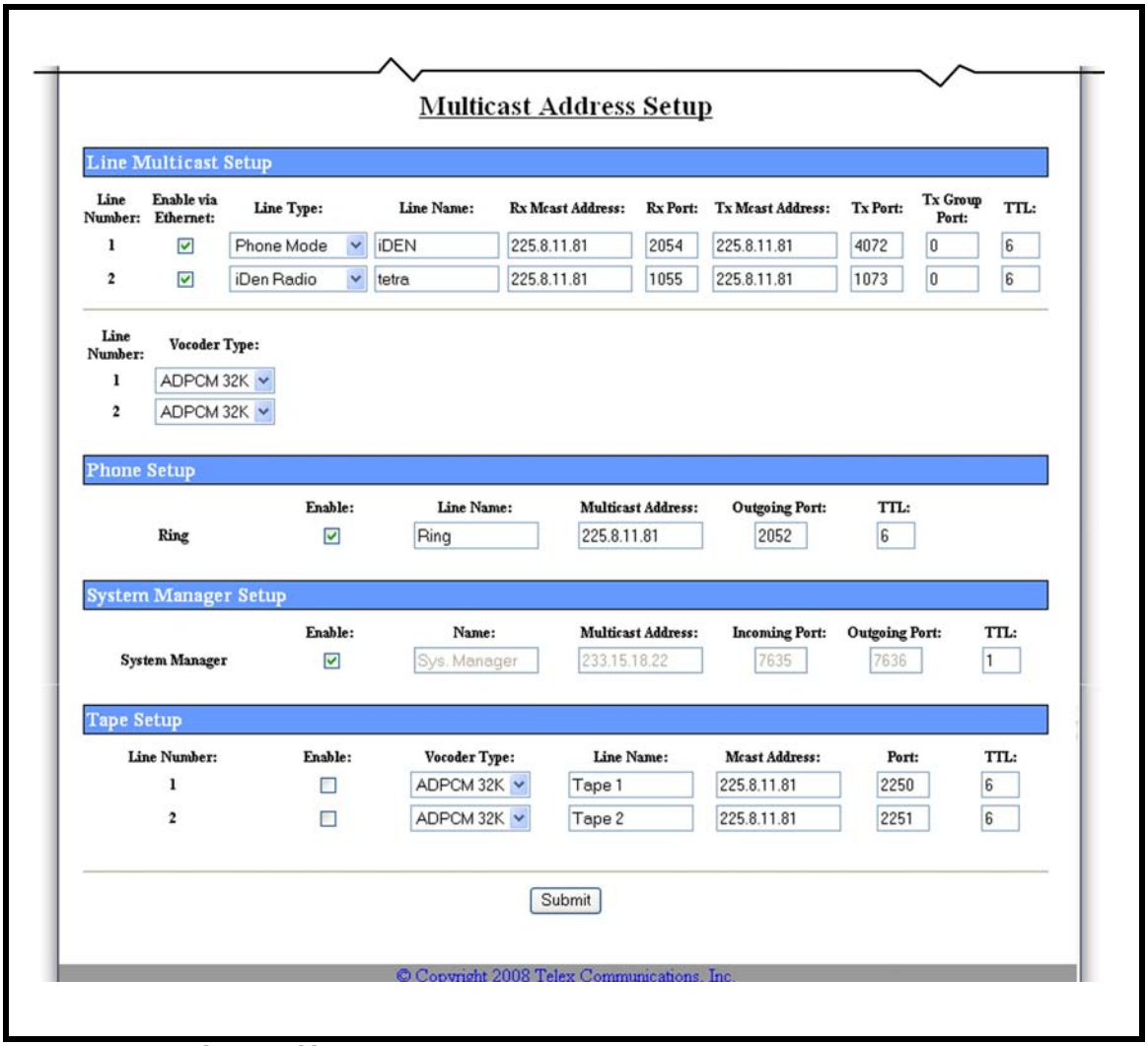

FIGURE 93. Multicast Address Setup

Line Multicast Setup

Line Number Field

The **Line Number** field displays the appropriate line number for the specified parameters.

Enable via Ethernet Check Box

The **Enable via Ethernet** check box indicates whether or not Ethernet connectivity is used for the line number. If selected, Ethernet connectivity is ON. Otherwise, audio received from the analog connections of the IP-223 are not echoed to the Ethernet, and Ethernet traffic is not mixed into the audio of the IP-223.

Line Type Drop Down Menu

The **Line Type** drop down menu identifies the operating mode for Line number 1 and 2. The line type for all other operating modes is displayed on the window. Selection of the line type enables the fields necessary to enter the setup information for the selected line type.

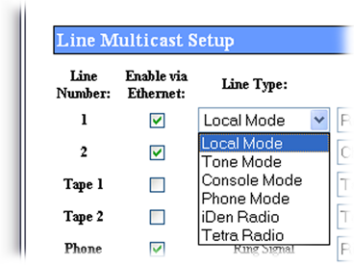

FIGURE 94. Line Type Drop Down Menu

Available selections for this field are:

Local Mode – The radio is connected directly to the IP-223 allowing for simple migration and full local control of the radio.

Tone Mode – The IP-223, based on Ethernet traffic, generates the keytones required to control standard, tone-equipped radio circuit. This allows an existing tone decoder and radio to be connected. This mode also supports a parallel analog console for local control.

Console Mode – Allows the use of existing tone-based consoles to the VoIP network. The IP-223 decodes standard tones, converts it into Ethernet traffic for another IP-223 and optional parallel IP consoles.

Phone Mode – Using a PIB or TDI, a line on the IP-223 is used to connect to an analog phone line.

iDEN Radio – Using the NI-223, allows interface with a Falcon Class push-to-talk (PTT) mobile phone system.

TETRA Radio Mode – Used to interface to a TETRA digital trunked system using the IP-223 and the Sepura SRM2000 mobile radio. The IP-223 interfaces the radio through the PEI allowing dispatch access to TETRA radio assets.

Line Name Field

The **Line Name** field is used to enter a descriptive name for the line.

This field can contain up to *12 characters*.

RX Mcast Address Field

The **RX Mcast** (Multicast) **Address** field identifies the broadcast address for all audio traffic received on a specific line. All consoles must have the same Multicast Address. The entry in the first Multicast Address field applies to the port number entered in the RX Port field.

NOTE: The option to use a different Multicast Address for the RX port is available. This provides flexibility and acts as a filter.

The range for this field is *224.0.0.2* to *239.255.255.255*.

RX Port Field

The **RX Port** field identifies the port number for each line. The port number must be unique, per line, and must be greater than 1054.

Based on the entries shown in Figure 93, any console attempting to transmit to line 1 must have a Multicast Address of 225.8.11.81 and an RX port number of 2054 to monitor RX audio and a TX port number of 4072 to monitor TX audio.

TX Mcast Address Field

TX Mcast (Multicast) **Address** field identifies the broadcast address for all audio traffic transmitted on a specific line. All consoles must have the same Multicast Address. The entry in the second Multicast Address field applies to the port number entered in the TX Port field.

NOTE: IP-223s can also operate Unicast (point-to-point), these fields can support class A, B, and C addresses.

NOTE: Make sure the RX and TX port numbers are unique.

The range for this field is *224.0.0.2* to *239.255.255.255*.

TX Port Field

The **TX Port** field identifies the port number for each line. The port number must be unique, per line, and must be greater than 1054.

Example: Based on the entries shown in Figure 93, any console attempting to transmit to line 1 must have a Multicast Address of 225.8.11.81 and an RX port number of 2054 to monitor RX audio and a TX port number of 4072 to monitor TX audio.

TX Group Port Field

The **TX Group Port** field is used to transmit to multiple IP-223s based on a unique port number.

TTL Field

The **TTL** (Time-To-Live) field identifies the number of routers the multicast audio packets go through before being stopped. Your specific network design dictates this value. If audio is not reaching a particular node on the network, increasing this value may correct the problem.

The range for this field is *1* to *128*.

To define the parameters for a line number, do the following:

NOTE: The following procedure outlines the entries required for each field on the Multicast Port Number Setup window. Depending on the line type selected, all entries listed may not be required or available for the line type.

1. From the links, select **Multicast Address Setup**.
   The Multicast Address Setup window appears.
2. Select the **Enable via Ethernet** check box, if Ethernet connectivity is used.
3. From the Line Type drop down menu, select the **operating mode**.
4. In the Line Name field, enter a **descriptive name** for the line.
5. In the first Multicast Address field, enter the **Multicast Address** for the RX port.
6. In the RX Port field, enter a unique **RX port number**.
7. In the second Multicast Address field, enter the **Multicast Address** for the TX port.
8. In the TX Port field, enter a unique **TX port number**.
9. In the TX Group Port field, enter the **TX group port number**, if applicable.

10. In the Channel Hops field, enter the **number of channel hops (routers)** the multicast audio packets can go through before being stopped.
11. Click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
12. From the links, select **Save to EEPROM**.
    The Save Setup Parameters window appears.
13. Click **Save Parameters**.
    The entries are saved to permanent memory.

Vocoder Type Drop Down Menu

The **Vocoder Type** drop down menu, shown in Figure 95, indicates the bit rate at which audio is converted into digital format. This feature is used to configure communication between the IP-223 and C-Soft.

Available selections for this field are: ***ADPCM*** *(Adaptive Differential Pulse Code Modulation) 16K and ADPCM 32K*.

NOTE: Design considerations must take into account that although 16K uses less bandwidth, the audio quality might not perform as desired.

IMPORTANT: Vocoder configurations must be the same across devices and C-Soft.

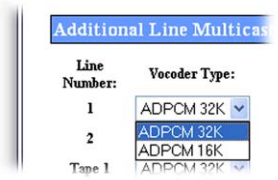

FIGURE 95. Vocoder Type Drop Down Menu

Phone Setup

Enable Check Box

The **Enable** check box is used to setup a phone ring when phone calls are received. The entry for a ring signal must be a unique Multicast Address and different from the other lines.

Line Name Field

The **Line Name** field is used to enter an alphanumeric label for the phone ring setup.

This field can contain up to *12 characters*.

Multicast Address Field

The **Multicast Address** field is used to enter the multicast address for the ring. This number must be between 224.0.0.2 and 239.255.255.255. The console must be setup with the same multicast address in order to hear the phone ring.

Outgoing Port Field

The **Outgoing Port** field identifies the port number where the ring packet is generated. This number must be unique and be between *1024* and *65535*.

NOTE: The ring Multicast Address and port number must match the console's ring multicast setting to receive the ring signal.

TTL Field

The **TTL** (Time-To-Live) field identifies the number of routers the multicast audio packets for the thing to pass through before being discarded. Network design dictates this value. See your network administrator for further information.

This field range is *0–128*, the default value is 6.

System Manager Setup

Enable Check Box

The **Enable** check box is used to enable communication with **TSM** (Telex System Manager). If unselected, TSM can not detect the IP-223. By default, the check box is selected. TSM is used to update IP-223 firmware. To learn how to update IP-223 firmware, see "Update Firmware" on page 111. See the Telex System Manager technical manual for operation details.

Name Field

The **Name** field displays *Sys Manager* and is not editable.

Multicast Address Field

The **Multicast Address** field displays the default Multicast Address used by TSM to detect connected VoIP hardware. This value is not editable.

Incoming Port Field

The **Incoming Port** field identifies the port used to communicate with TSM. TSM requests data from the IP-223 through this port. This field is automatically populated and is not editable.

Outgoing Port Field

The **Outgoing Port** field identifies the port used to communicate with TSM. The IP-223 sends data through this port to TSM. This field is automatically populated and is not editable.

TTL Field

The **TTL** (Time To Live) field identifies the number of routers the multicast audio packets pass through before being discarded. The value in this field is entered by default and used by TSM to communicate with VoIP hardware. This value is not editable.

The range for this field is *1* to *128*.

Tape Setup

Enable Check Box

The **Enable** check box is used to setup a tape recorder for the specified line.

Vocoder Type Drop Down Menu

The **Vocoder Type** drop down menu, shown in Figure 96, indicates the bit rate at which audio is converted into digital format. This feature is used to configure communication between the IP-223 and C-Soft.

Available selections for this field are: ***ADPCM*** *(Adaptive Differential Pulse Code Modulation) 16K and ADPCM 32K*.

NOTE: Design considerations must take into account that although 16K requires less bandwidth, the audio quality might not perform as desired.

IMPORTANT: Vocoder configurations must be the same across devices and C-Soft.

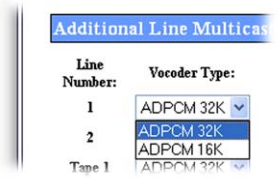

FIGURE 96. Vocoder Type Drop Down Menu

NOTE: When Tape 1 is enabled, a separate stream is created with both RX and TX audio for that line. When Tape 2 is enabled, a separate Ethernet stream is created with both RX and TX audio for that line. This stream can then be recorded by a Telex Network Recorder.

Line Name Field

The **Line Name** field is used to assign a unique label to the tape line.

Mcast Address Field

The **Mcast Address** field is used to configure the Mulitcast Address used to generate multicast audio for the recorder.

Port Field

The **Port** field is used to configure the port used to generate multicast audio for the recorder.

TTL Field

The **TTL** (Time To Line) field identifies the number of routers the multicast audio packets pass through before being discarded.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

IMPORTANT: The submit button saves changes in temporary memory only.

To **permanently save changes,** do the following:

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.

2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.

3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console

Per Line Setup Window

The **Per Line Setup** window identifies the parameters for the line type selected for the line on the Multicast Port Number Setup window. The line number to which the details on the window apply is displayed at the top of the window. The line type selected determines the window display and enables the appropriate fields on the window necessary to enter the setup information for the line type.

NOTE: Clicking **Per Line Setup** displays the Per Line Setup window, shown in Figure 97.

Per Line Setup Window—Local, Tone, and Console Mode Configuration

The **Per Line Setup** window for **Local, Tone, or Console Mode** configuration, see Figure 97, appear when Local, Tone or Console is selected from the Line Type drop down menu on the Multicast Address Setup window.

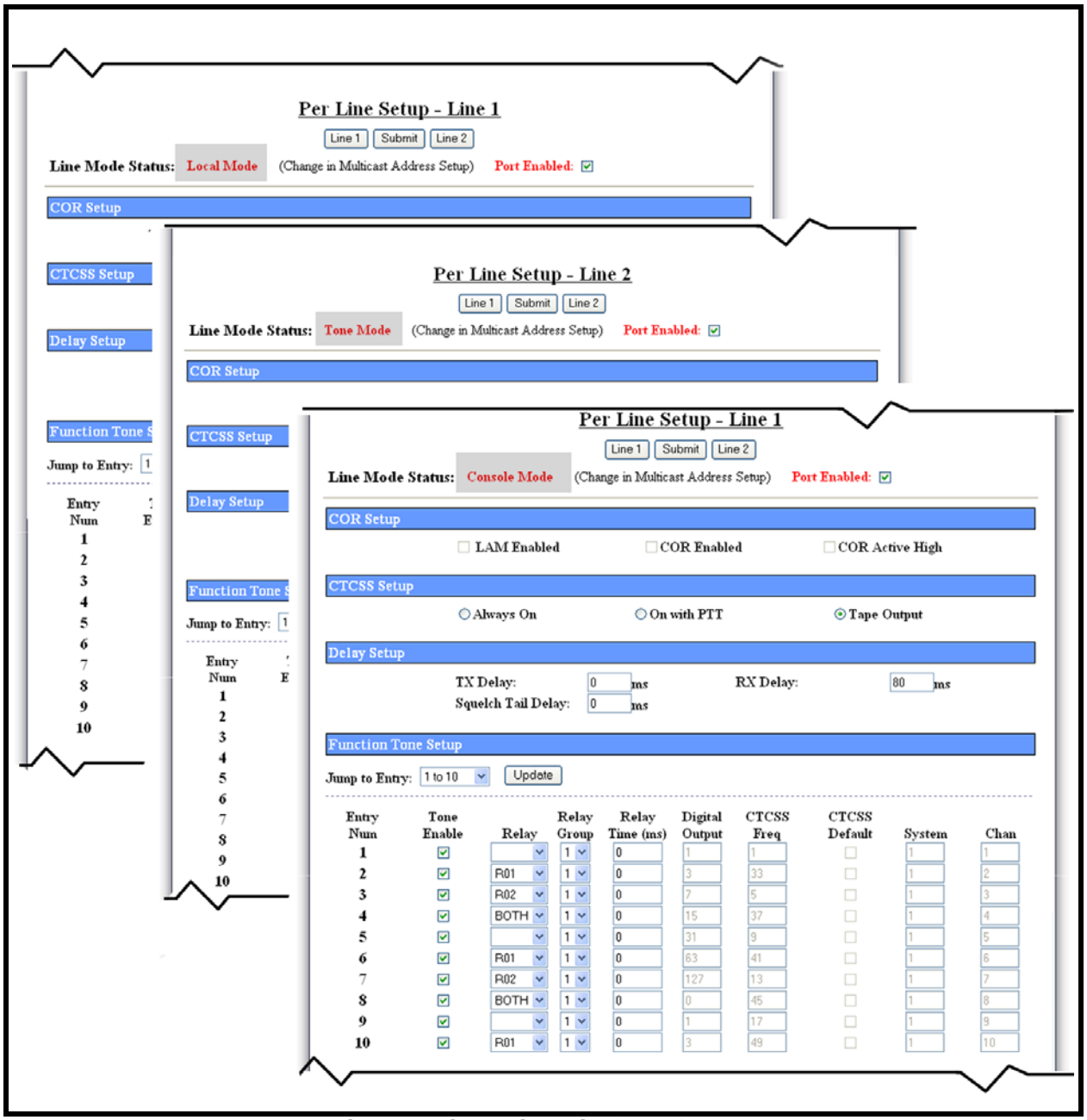

FIGURE 97. Per Line Setup - Local, Tone, and Console Modes (view 1)

Line 1 Button

Select the **Line 1** button is used to navigate to the Per Line Setup window for Line 1 configuration.

Line 2 Button

The **Line 2** button is used to navigate to the Per Line Setup window for Line 2 configuration.

Submit Button

To **permanently save changes,** do the following.

1. Click **Submit**. 

The console name appears at the top of the Welcome window.
2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Line Mode Status Field

The **Line Mode Status** field displays the line type assigned to the line in the “Multicast Address Setup Window” on page 49. With the exception of digital output, CTCSS frequency, CTCSS default system and chan fields in the Function Tone Setup section, the Per Line Setup window for Local, Tone, or Console mode contains the same configuration options and are discussed below.

Port Enabled Check Box

The **Port Enabled** check box indicates whether or not the port is enabled. If selected, the port is enabled and selection of transmission or play received audio is allowed.

COR Setup

LAM Enabled Check Box

The **LAM** (Line Activity Monitor) **Enabled** check box is used to monitor the line for the signal level configured in the LAM Level field. see “LAM Level Field” on page 61.

COR Enabled Check Box

The **COR Enabled** check box indicates whether or not the COR I/O pins (DiG6, pin 20 of the DB25 connector) are enabled. If selected, the IP-223 monitors the COR for line activity.

COR Active High check box

The **COR Active High** check box indicates whether or not the polarity of the COR is high. If selected, the COR active signal is high.

NOTE: LAM and COR can both be selected at the same time.

NOTE: LAM and COR are used to check audio signal for processing.

CTCSS Setup

Always On Radio Button

The **Always On** radio button indicates whether or not CTCSS is ON at all times.

On With PTT Radio Button

The **On With PTT** radio button indicates whether or not CTCSS is generated only when PTT is activated.

Tape Output Radio Button

The **Tape Output** radio button indicates whether or not CTCSS is generated. If selected, no CTCSS is generated. This audio output is used as an analog sum of RX and TX audio for the line. The output port is a single ended capacitor coupled.

Delay Setup

TX Delay Field

The **TX Delay** field identifies the delay, in ms, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0* to *2000ms*.

RX Delay Field

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a COR or LAM triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables using COR or LAM.

The range for this field is *0* to *1000ms*.

Squelch Tail Delay Field

The **Squelch Tail Delay** field identifies the amount of time, in ms, the RX audio is muted after PTT occurs. This provides the ability to overcome squelch tail ping-pong in crosspatch modes by muting the radio RX input after PTT occurs.

The range for this field is *0* to *5000ms*.

Function Tone Setup

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select (in groups of 10) function tones to view and modify.

1. From the Jump To drop down menu, select the **group of 10 function tones** you want to view.
2. Click the **Update** button.
   The function tones you select appear.

Update Button

The **Update** button searches and displays the selection you chose from the Jump To drop down list.

Tone Enable Check Box

The **Tone Enable** check box indicates whether or not the function tone is active. If selected, the function tone is active. The frequency for the tone is set on the Tone Frequency and Durations window described on page 112. The standard function tones and their frequencies are the default entries. These entries are shown in Table 7 on page 114.

NOTE: At least one function tone must be selected.

Relay Drop Down Menu

The **Relay** drop down menu, shown in Figure 98, identifies the relay(s), if any, closed immediately upon receipt of the function tone.

Available selections for this field are: *no selection, R01, R02,* or *BOTH*.

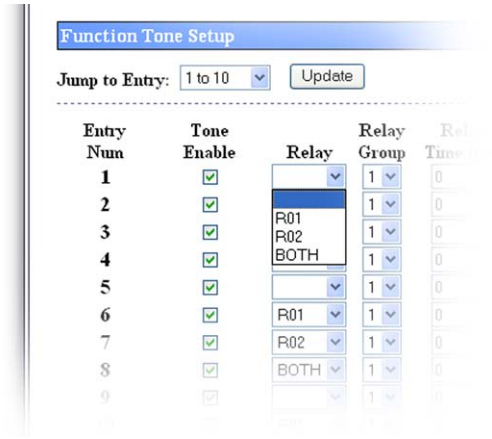

FIGURE 98. Relay Drop Down Menu—Per Line Setup

Relay Group Drop Down Menu

The **Relay Group** drop down menu identifies if a relay is grouped into separate functions. This allows more than one relay to be activated at any particular time by being in separate groups. For example, when F1 has R1 selected as its relay, and F2 has R2 selected as its relay, setting the two Relay Group numbers to the same value allows multiple relays with different functions. In this scenario, the relays for F1 and F2 are interlocked. When the Relay Group assigned to F1 and F2 are different, R2 does not activate when F1 is received. Furthermore, when there is no relay selected for a function tone, but the assigned relay group is used by another relay group, when the function tone is received, all relays in the group are activated. This allows relay R1 and R2 to be assigned to different groups and use other function tones within the same relay group to activate them.

Select either *1* or *2* from the drop down menu.

Relay Time (ms) Field

The **Relay Time (ms)** field identifies if the selected relay(s) latch ON when the function tone is received, or if the selected relay(s) is latched ON for a specified period of time when the function tone is received. To program the relay(s) to latch ON when the function tone is received enter a zero (0) in the field. To set the duration the relay(s) is latched ON, enter the desired amount of time, in ms, in the field.

The range for this field is *0 to 32000*.

Digital Output Field - Local Mode Only

The **Digital Output** field identifies the DIG0-DIG6 output for the function tone. Enter the numeric value shown in the Value column in Table 9 “Digital Output Table” on page 133, for the desired DIG0-DIG6 output.

The range for this field is *0 to 127. H=high (ON), L=low (OFF).* Using DIG6 for COR input limits the digital output value from *0 to 63.*

CTCSS Freq Field - Local Mode Only

The **CTCSS Freq** field identifies the CTCSS tone frequency set for the function tone. Enter the desired Tone Number shown on Table 8 in “CTCSS Tone Frequency Table” on page 131. If zero (0) is entered, there is no CTCSS tone frequency set for the function tone

CTCSS Default Check Box - Local Mode Only

The **CTCSS Default** check box indicates whether or not the entry in the CTCSS Freq field is ignored and the last selected value is generated during PTT. For example, F1 is used for all transmissions and CTCSS Default is selected for F1. F2-F8 have different CTCSS values programmed for them and the CTCSS Default check box is cleared. Selecting F2 and then keying up on F1 sets the CTCSS tone to the F2 value. Selecting F4 sets the CTCSS tone to the F4 value. When PTT is pressed, F1 is the default frequency and the F4 CTCSS tone is sent.

System Field - Local Mode

The **System** field is used to control radios serially connected to the IP-223. Once configured, the IP-223 directs audio to the system entered in the field.

When the function tone is changed by the console operator, this setting, along with the Chan field setting, directs the radio to the system and frequency configured in the field. This field works in conjunction with the Chan field.

This field can contain up to *3 digits*.

Chan Field - Local Mode

The **Chan** field is used to control radios serially connected to the IP-223. Once configured, the IP-223 directs audio to the channel (frequency) entered in the field.

When the function tone is changed by the console operator, this setting, along with the System field setting, directs the radio to the system and frequency configured in the field. This field works in conjunction with the System field.

This field can be configured for up to *100 frequencies*.

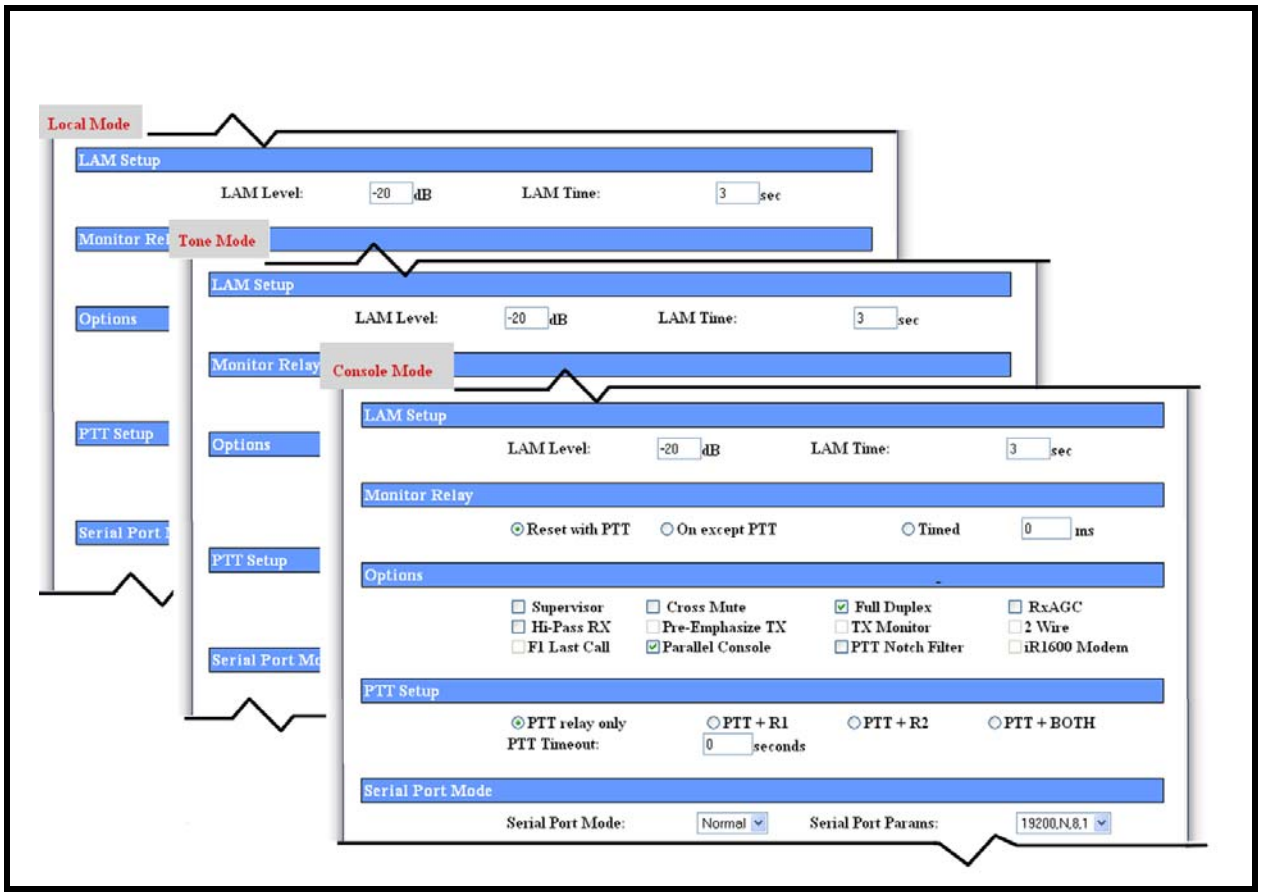

FIGURE 99. Per Line Setup - Local Tone and Console Modes (view 2)

LAM Setup

LAM Level Field

The **LAM Level** field identifies the threshold, in dB, at which the radio/line un-mutes and sends RX packets to the Ethernet.

The range for this field is *-50 to +10dB.*

LAM Time Field

The **LAM** Time field identifies the amount of time, in seconds, the LAM level can drop below the threshold without action from the IP-223. It allows small gaps in the audio sequence.

The range for this field is *0 to 60 sec*.

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay-contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission (required by FCC regulations on stations equipped with CTCSS). Select one of the following operating modes for the monitor relay:

Reset with PTT – When selected, the monitor relay is closed from the time the monitor tone sequence is received until the next PTT operation.

On except PTT – When selected, the monitor relay is latched at all times except when PTT is active, whether the monitor function tone is received or not.

Timed – When selected, enter the amount of time, in ms, the monitor relay is latched.

Options

Options

If an **Options** field cannot be selected, the particular option is not available for the line number to which the details on the window apply.

Supervisor Check Box

The **Supervisor** check box indicates whether or not the Supervisory I/O pin (DIG1, pin 21 of the DB25 connector) is enabled. If selected, parallel console supervisory control is enabled and control of the radio can be seized from other consoles.

Cross Mute Check Box

The **Cross Mute** check box indicates whether or not the crossmute I/O pin (DIG0, pin 8 of the DB25 connector) is enabled. If selected, parallel console crossmute control is enabled. Crossmute is used to mute the parallel consoles during a parallel transmission.

Full Duplex Check Box

The **Full Duplex** check box indicates whether or not full duplex audio is supported. If selected, full duplex (TX and RX transmission) audio is allowed.

RxAGC Check Box

The **RxAGC** (Receive Automatic Gain Control) check box indicates whether or not the radio RX audio includes an AGC. If selected, an AGC step is added to the radio RX audio. This results in the transmission of a more consistent radio RX audio by increasing the level of low audio and decreasing the level of loud audio.

Hi-Pass RX Check Box

The **Hi-Pass RX** check box indicates whether or not RX audio below 300Hz is blocked. If selected, RX audio below 300Hz is blocked.

Pre-Emphasize TX Check Box

The **Pre-Emphasize TX** check box indicates whether or not TX audio includes a standard 6dB octave pre-emphasis. If selected, a standard 6dB octave pre-emphasis is included in the TX audio.

TX Monitor Check Box

The **TX Monitor** check box indicates whether or not TX audio from parallel consoles in 4-wire mode are sent to the Ethernet as a transmit packet. If selected, TX audio from parallel consoles in 4-wire mode are sent to the Ethernet as a transmit packet.

2-Wire Check Box

The **2-Wire** check box indicates whether or not the line number to which the details on the window apply is configured as 2-wire. If selected, the line number to which the details on the window apply is configured as a 2-wire line.

Parallel Console Check Box

The **Parallel Console** check box indicates whether or not a parallel console is being used (for example, a legacy tone console, only available in console and tone mode). If selected, a parallel console is attached to the system.

NOTE: Must be enabled when console is configured for EIA.

NOTE: Must be enabled when configuring for Console Mode.

PTT Notch Filter Check Box

The **PTT Notch Filter** checkbox, when selected, indicates the 2175Hz notch filter is enabled. When selected, 2175Hz ±180Hz frequency range is filtered during PTT. Use this option when 2175Hz is blocking desirable audio.

PTT Setup

The **PTT Setup** section allows a secondary external function to be controlled with a separate relay closure at the same time as the PTT relay. Select one of the following:

PTT relay only – When selected, only the PTT relay is closed. (Default Setting)

PTT + R1 – When selected, both the PTT relay and the R1 relay close at the same time.

PTT + R2 – When selected, both the PTT relay and the R2 relay close at the same time.

PTT + BOTH – When selected, the PTT relay, the R1 relay, and the R2 relay close at the same time.

PTT Timeout Field

The **PTT Timeout** field is used to indicate how long, in seconds, to allow PTT to be active when no audio is transmitted. If a time is entered in the field, PTT activity will timeout after the designated amount of time has lapsed. This feature is useful in cases where the line goes offhook for an indefinite period of time due to a stuck PTT key.

The range for this field is *0 to 1800sec*. To disable this feature, enter *zero (0)*.

Serial Port Mode

Serial Port Mode Drop Down Menu

The **Serial Port Mode** drop down menu, shown in Figure 100, is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The freq scan list function synchronizes the console scan list with the radio's scan list.

By default, the serial port in Tone or Console mode is *Normal*.

Available selections for this field are: *Normal, FleetSync Series 80, FleetSync Series 80 - Scan List, FleetSync Series 90, FleetSync Series 150, FleetSync Series 150 - Scan List, FleetSync Series 180, FleetSync Series 180 - Scan List, Kenwood 5710* and */5810, EF Johnson 5300.*

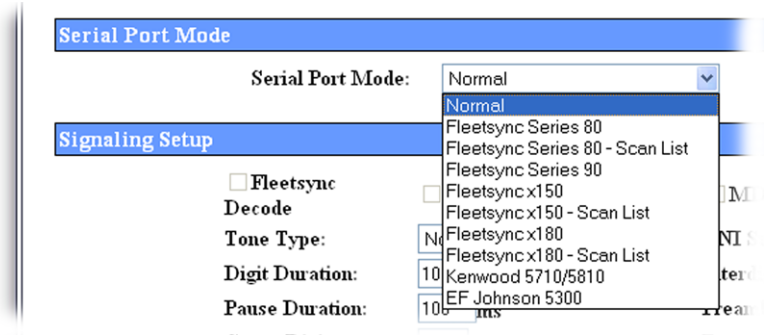

FIGURE 100. Serial Port Drop Down Menu - Local Mode

Serial Port Params Drop Down Menu

The **Serial Port Params** (Parameters) drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits.

The serial port parameters in Tone or Console mode is, by default, *19200.N.8.1*

Available selections for this field in Local mode are: 300,N,8,1; 300,N,8,2; 300,E,7,1; 1200,N,8,1; 1200,N,8,2; 1200,E,7,1; 2400,N,8,1; 2400,N,8,2; 2400,E,7,1; 4800,N,8,1; 4800,N,8,2; 4800,E,7,1; 9600,N,8,1; 9600,N,8,2; 9600,E,7,1; 19200,N,8,1; 19200.N.8.1; 19200,E,7,1. See Figure 100.

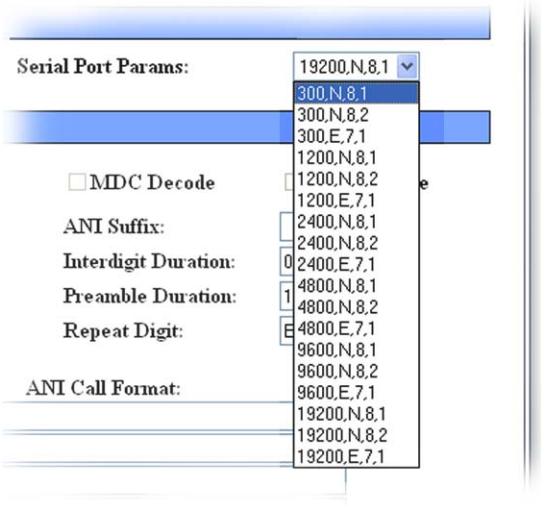

FIGURE 101. Serial Port Params Drop Down Menu - Normal Mode

NOTE: If necessary, refer to the Radio Dispatch and Signaling Equipment downloads available on the Telex website (www.telex.com) for this setting based on the radio to be installed.

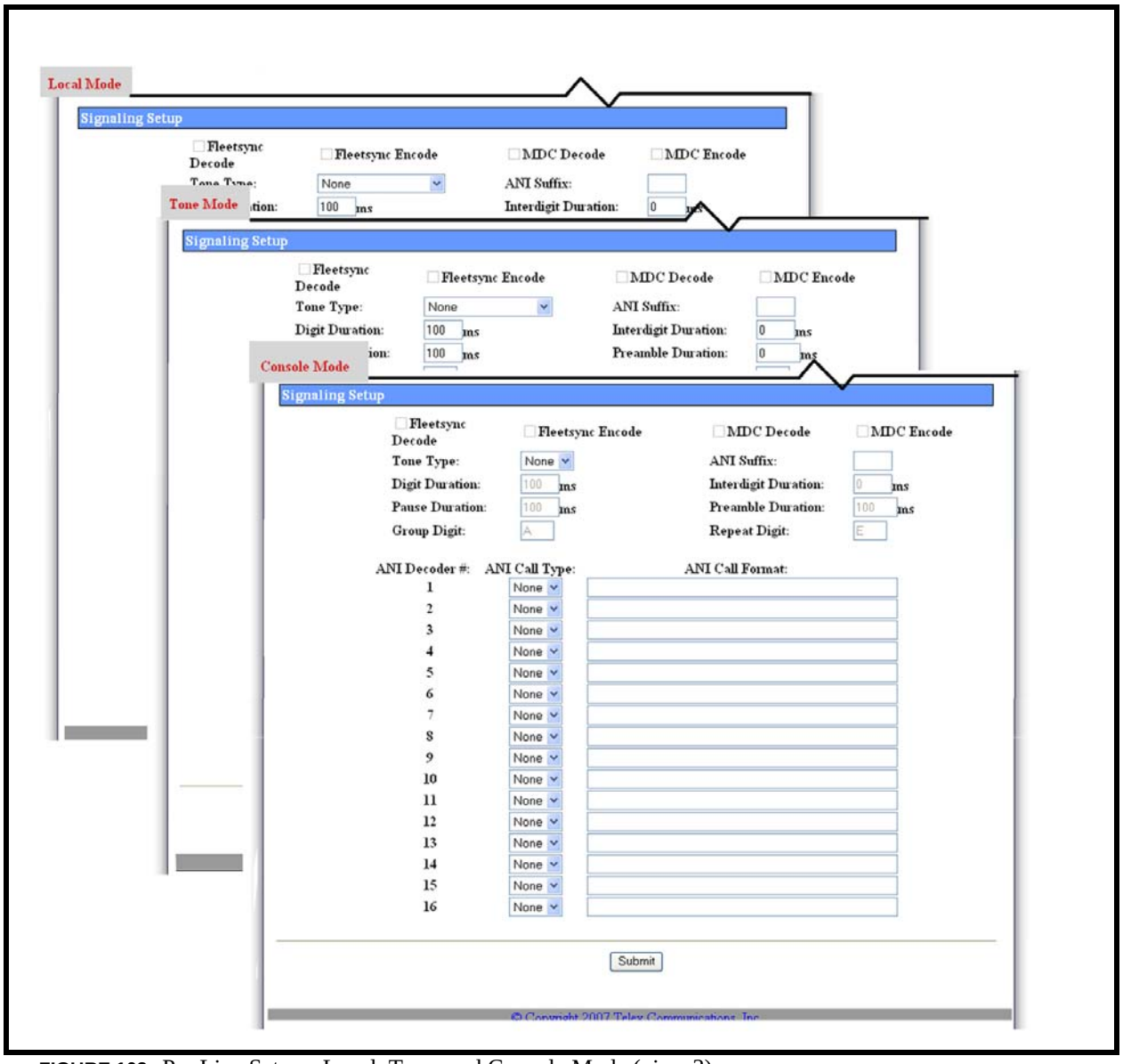

FIGURE 102. Per Line Setup - Local, Tone, and Console Mode (view 3)

Signaling Setup

The **Signaling Setup** section is used to setup encode, decode, tone type and digits pause and duration.

IMPORTANT: The FleetSync features in this section are optional IP-223 accessories. See “IP-223 Accessories” on page 15 for part numbers.

FleetSync Decode Check Box (Tone and Local Modes)

The **FleetSync Decode** check box is used to enable the line for radio IDs with FleetSync ANI capabilities to decode their alias, ID numbers, and messages on Telex consoles within the system. If selected, Kenwood FleetSync's over-the-air ANI is enabled and the ANI number or name is decoded via the ANI lookup tables and displayed on Telex IP based consoles.

FleetSync Encode Check Box (Local Mode Only)

The **FleetSync Encode** check box indicates the line is enabled to encode Kenwood FleetSync signaling.This optional feature enables FleetSync PTT ID, status, selective call, and text messaging.

If selected, “Additional Feature Setup Window” on page 100, must be configured.

MDC Decode Check Box (Tone and Local Modes)

The **MDC Decode** check box is used to enable the line to receive and decode Motorola MDC signaling to display ID numbers, status IDs, emergency calls, and alerts. If selected, MDC signaling is enabled and the ID number or name is decoded via the ANI lookup tables and displayed on Telex IP based consoles.

MDC Encode Check Box

The **MDC Encode** check box is used to enable the line to transmit and encode Motorola MDC signaling to display the consoles ID number, status ID, emergency or alert. If selected, MDC Signaling is enabled and the ID number or name is encoded via the ANI lookup tables and appears on the MDC radio in the field

IMPORTANT: This feature is not enabled on versions 4.100 or earlier. The MDC Encode check box serves as a placeholder for future implementation.

Tone Type Drop Down Menu

The **Tone Type** drop down menu, shown in Figure 103, identifies the signaling type used when receiving a call.

Available selections for this field are: *None*, *CCIR1*, *CCIR2*, *DTMF*, *DZVEI*, *EEA*, *EIA*, *EURO*, *KENWOOD 5TONE*, *MODAT*, *NATEL*, *PCCIR*, *PDZVEI*, *PZVEI*, *ZVEI1*, and *ZVE12*.

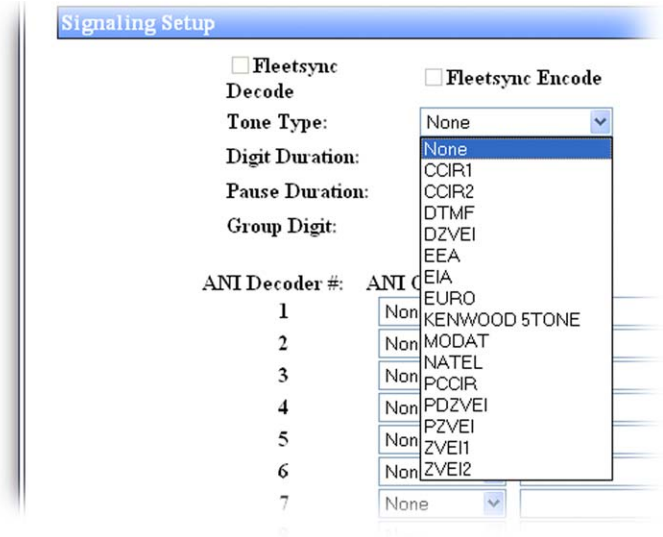

FIGURE 103. Tone Type Drop Down Menu

ANI Suffix Field

The **ANI Suffix** field identifies a *0 to 3 digit* suffix is appended to the end of the ANI received. For example, if you have a suffix 123 and the ANI 9876 is received, the IP-223 sends 9876123 to the consoles. This is useful if two (2) different lines have duplicate ANI IDs.

Digit Duration Field

The **Digit Duration** field identifies the length of time, *in ms*, the digit tone is decoded when it is active for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Interdigit Duration Field

The **Interdigit Duration** field identifies the length of time, *in ms*, between the digit tones for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

NOTE: Some radio systems require an extended first tone, to allow time to activate the receivers.

Pause Duration Field

The **Pause Duration** field identifies the length of time, *in ms*, allowed between received groups for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Preamble Duration Field

The **Preamble Duration** field identifies the length of time, *in ms*, the first tone is sent for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Group Digit Field

The **Group Digit** field identifies the group digit. The group digit is a wild card that can represent any digit. Placing a group digit within a filter allows any digit appearing at that location in the tone string to pass through the filter.

Field values can be *0 - 9 or A - F. The default is A.*

Repeat Digit Field

The **Repeat Digit** field identifies the digit that separates two digits sent back to back. On occasion, radio system messages require two of the same digits to be entered back to back. Use of repeat digits delimits tone duration ensuing continuous transitions.

The default for this field is *E.*

ANI Decoder # Field

The **ANI Decoder #** field lists in sequential order the available ANI Decoders.

ANI Call Type Drop Down Menu

The **ANI Call Type** drop down menu, shown in Figure 104, identifies the type of call for the ANI Decoder #.

Available selections for this field are: *Emergency, Group, Individual*, or *Status*.

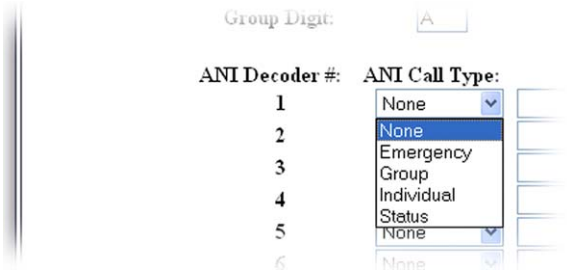

FIGURE 104. ANI Call Type Drop Down Menu-Per Line Setup

ANI Call Format Field

The **ANI Call Format** field identifies the call string format for the ANI Decoder #. The format is a free form string entry of up to 16 digits. These include digits 0 - 9, A-D (A-F for other formats), *, # and the following characters:

I (Caller ID) – Placed into the ID field of the ANI packet or the ANI field of the caller portion of the telegram. The ID is stored as a 32-digit string in the packet.

G (Group Digits) – Stored in the Group section of the ANI packet. The group value is converted to a decimal number and is stored as an 8-digit string in the packet.

S (Status) – Digits represented by S are interpreted as status information. These values are converted to decimal numbers and stored as an 8-digit status string in the ANI packet. The console has a corresponding list of the status numbers and descriptions that are displayed upon receipt of the packet.

P (Pause) – When inserted into the string, a pause is expected in this location. The pause duration is set in the Pause Duration field (see “Pause Duration Field” on page 67).

R (Calling ID) – Used to delineate the location of the digits being used for a selective call. These digits represent the address or ID of the person being called. They are stored in the ANI packet as an 8-digit string.

Per Line Setup Window—Phone Mode Configuration

The **Per Line Setup** window for **Phone Mode** configuration**,** see Figure 105, appears when Phone is selected from the Line Type drop down menu on the Multicast Address Setup window. In Phone mode, the following options are available for per line configuration.

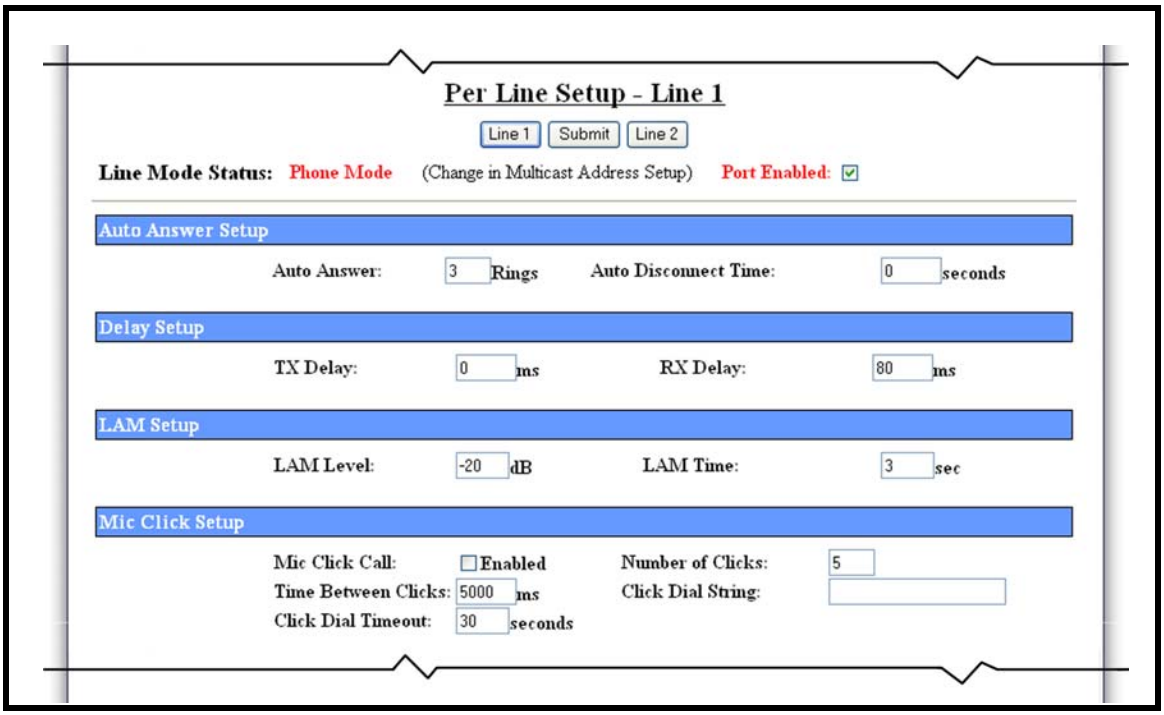

FIGURE 105. Per Line Setup - Phone Mode (view 1)

Auto Answer Setup

Auto Answer Field

The **Auto Answer** field identifies the number of times the phone rings before the line goes offhook. This field is used to remotely enable a IP-223 to PIB or TDI connection.

Auto Disconnect Time Field

The **Auto Disconnect Time** field identifies the amount of time, in seconds, before the IP-223 automatically places the PIB or TDI adapter onhook or disconnects if the threshold entered in the LAM Level field described below is not reached.

Delay Setup

TX Delay Field

The **TX Delay** field identifies the delay, *in ms*, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0 to 2000ms*.

RX Delay Field

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a COR or LAM triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables using COR.

The range for this field is *0 to 1000ms*.

LAM Setup

LAM Level Field

The **LAM Level** field identifies the threshold, in dB, at which the radio/line un-mutes and sends RX packets to the Ethernet.

The range for this field is *-50 to +10dB.*

LAM Time Field

The **LAM Time** field identifies the amount of time, in seconds, the console continues to play audio when receiving audio above the LAM threshold specified in the LAM Level field. This entry is also used by the Ethernet to determine how long to send audio.

The range for this field is *0 to 60 sec*.

Mic Click Setup

Mic Click Call Enabled Check Box

The **Mic Click Call Enabled** check box indicates whether or not a remote radio user can click the radio PTT a specified number of times within a specified period of time to dial a programmed number. If selected, a remote radio user can click the radio PTT a specified number of times within a specified period and, upon receipt of this sequence, the IP-223 takes the PIB or TDI offhook and automatically dials the number in the Click Dial String field.

Number of Clicks Field

The **Number of Clicks** field identifies the number of times the radio PTT must be pressed to automatically dial the number in the Click Dial String field.

The range for this field is *1* to *5*.

Time Between Clicks Field

The **Time Between Clicks** field identifies the amount of time, in ms, allowed between mic clicks.

The range for this field is *0* to *9999ms*.

Click Dial String Field

The **Click Dial String** field identifies the number automatically dialed when the radio PTT is pressed the number of times specified in the Number of Clicks field.

Click Dial Timeout Field

The **Click Dial Timeout** field identifies the amount of time, in seconds, the phone rings before hanging up.

The range for this field is *10* to *60 sec.*

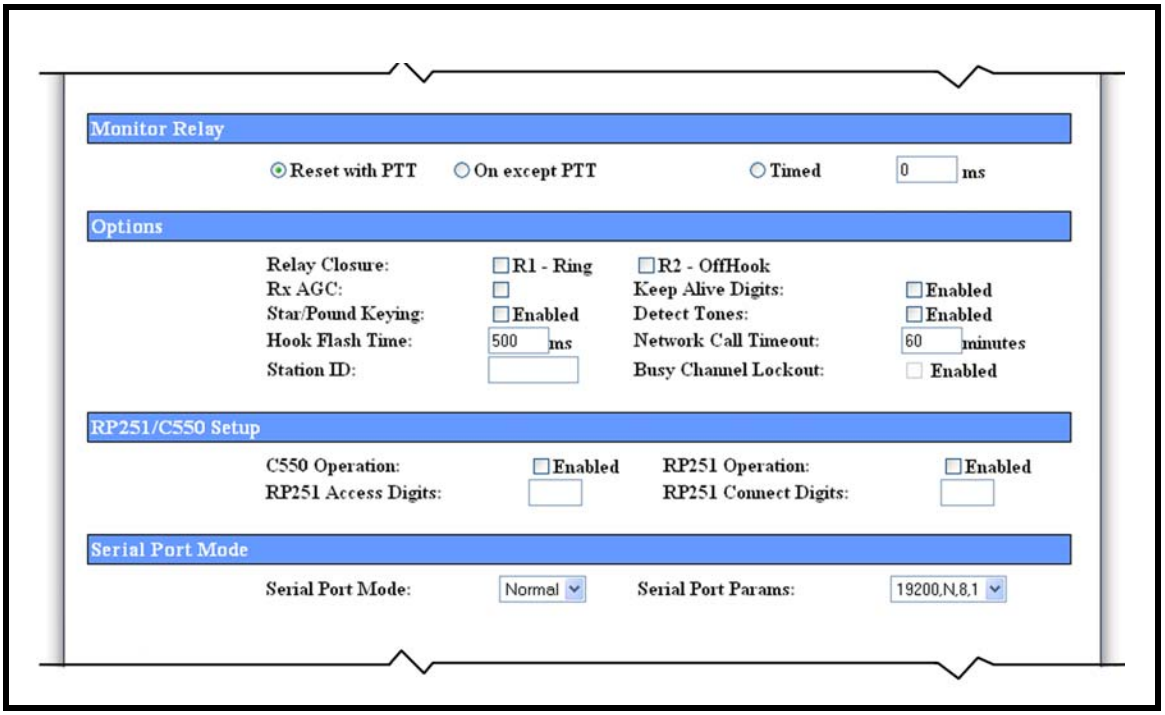

FIGURE 106. Per Line Setup - Phone Mode (view 2)

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay-contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission (required by FCC regulations on stations equipped with CTCSS). Select one of the following operating modes for the monitor relay:

Reset with PTT – When selected, the monitor relay is closed from the time the monitor tone sequence is received until the next PTT operation.

On except PTT –When selected, the monitor relay is latched at all times except when PTT is active, whether the monitor function tone is received or not.

Timed – When selected, enter the amount of time, *in ms*, the monitor relay is latched.

Options

Relay Closure

R1 - Ring Check Box

The **R1 - Ring** check box indicates whether or not the R1 relay opens and closes in step with the ring cadence. If selected, the R1 relay opens and closes in step with the ring cadence.

R2 - OffHook Check Box

The **R2 - OffHook** check box indicates whether or not the R2 relay opens when the phone is taken offhook. If selected, the R2 relay opens when the phone is taken offhook.

Rx AGC Enabled Check Box

The **RxAGC Enabled** check box indicates whether or not the phone audio includes an AGC. If selected, an AGC step is added to the phone RX audio. This results in a more consistent phone RX audio by increasing the level of low audio and decreasing the level of loud audio.

NOTE: This is a software driven AGC. The per line hardware AGC is not used.

Keep Alive Digits Enabled Check Box

The **Keep Alive Digits Enabled** check box indicates whether or not keep alive digits are generated at the remote site or responded to at a local site. Keep Alive Digits are responsible for verifying the phone connection status - active or inactive.

Star/Pound Keying Enabled Check Box

The **Star/Pound Keying Enabled** check box indicates whether or not an inbound caller on the phone line has the capability to control the radio connected to the opposite line of the IP-223. Used in conjunction with Auto Answer and Auto Disconnect Time, this function allows the user to key-up and key-down the radio. If selected, the inbound caller can key-up and key-down the radio connected to the opposite line of the IP-223. The star key (*) keys up the radio, the pound key (#) keys down the radio. Pushing double # hangs up the remote phone line.

Detect Tones Enabled Check Box

The **Detect Tones Enabled** check box indicates whether or not key-up tones detected on the phone line automatically keys up the radio on the opposite line of the IP-223. This parameter is used in Radio Phone Mode.

Hook Flash Time Field

The **Hook Flash Time** field identifies the amount of time, in ms, an offhook line is temporarily placed during a hook flash.

The range for this field is *0* to *9999ms*.

Network Call Timeout Field

The **Network Call Timeout** field identifies the amount of time, in minutes, before a network call is automatically placed onhook.

The range for this field is *0* to *60min*.

Station ID Field

The **Station ID** field is used to enter a unique ID number to identify the line. This ID is sent after an auto-answer event.

This field can contain up to *12 digits*.

Busy Channel Lockout Check Box

The **Busy Channel Lockout** check box indicates outgoing FleetSync messages are placed in queue until the radio is idle. FleetSync messages can be lost when sent on half-duplex radios. Selecting this check box avoids lost messages.

RP251/550 Setup

NOTE: These features support legacy PSTN radio control systems.

C550 Operation Enabled Check Box

The **C550 Operation Enabled** check box indicates whether or not operation of the C-550 console is enabled. If selected, operation of the C-550 console is enabled.

RP251 Operation Enabled Check Box

The **RP251 Operation Enabled** check box indicates whether or not operation of the RP-251 panel is enabled. If selected, operation of the RP-251 dial-up remote station panel is enabled.

RP251 Access Digits Field

The **RP251 Access Digits** field identifies the three (3) digit access code assigned to the RP-251 panel.

RP251 Connect Digits Field

The **RP251 Connect Digits** field identifies the three (3) digit connect code sent to the console at the time of connection.

Serial Port Mode

Serial Port Mode Drop Down Menu

The **Serial Port Mode** drop down menu is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The freq scan list function synchronizes the console scan list with the radio's scan list.

The serial port in Phone mode is, by default, *Normal*.

Serial Port Parameters Drop Down Menu

The **Serial Port Params** drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits. The Baud rate is used in phone mode. If phone mode is enabled on line 1, this is the rate used to connect to the IP-223 via the HyperTerminal.

The default setting for the field, *19200.N.8.1*, is not configurable.

If necessary, refer to the Radio Dispatch and Signaling Equipment downloads available on the Telex website (www.telex.com/RadioDispatch/) for this setting based on the radio to be installed.

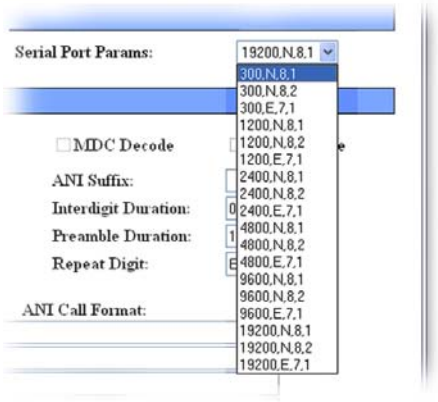

FIGURE 107. Serial Port Params Drop Down Menu - Phone Mode

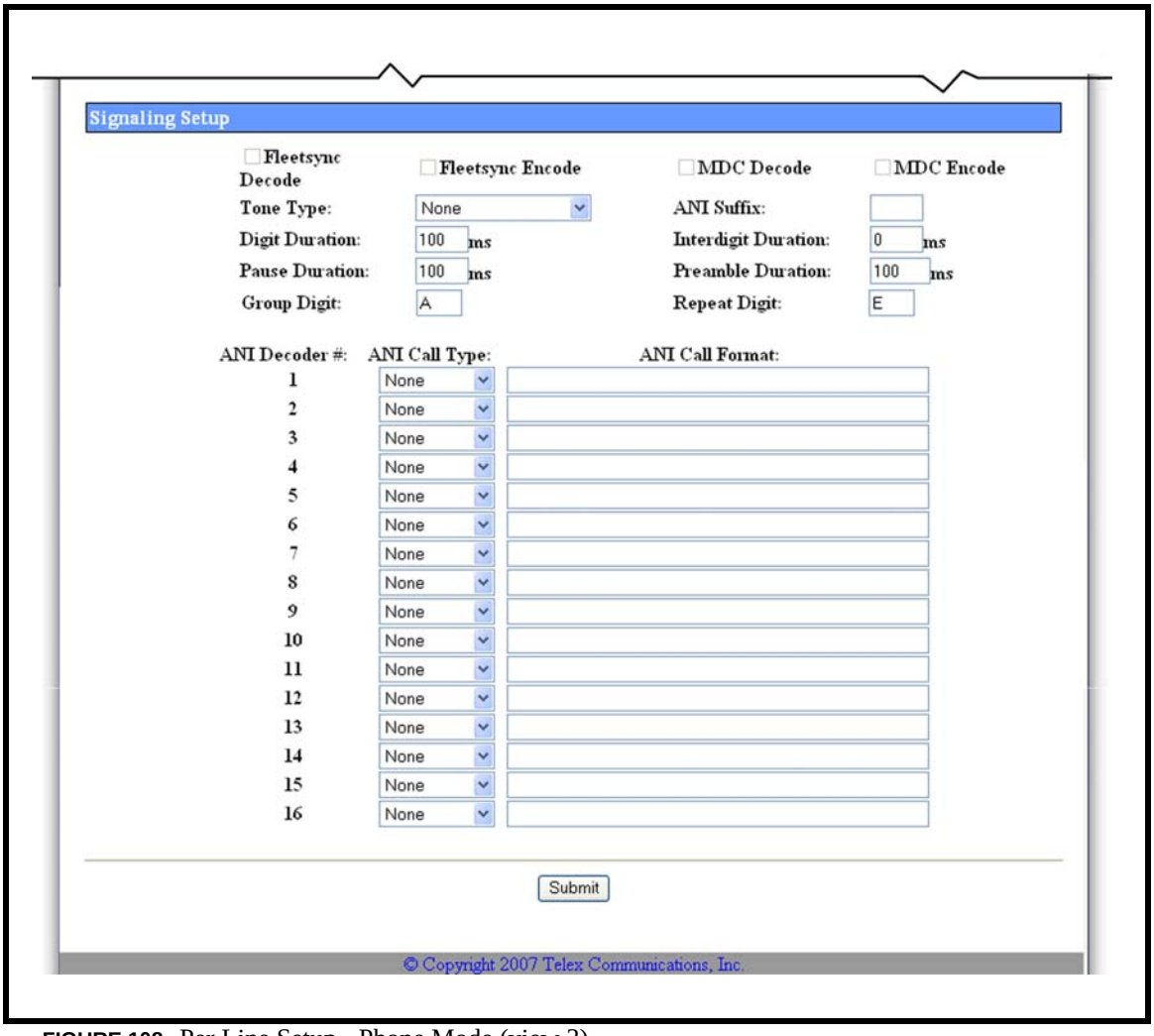

FIGURE 108. Per Line Setup - Phone Mode (view 3)

Signaling Setup

The **Signaling Setup** section is used to setup encode, decode, tone type and digits pause and duration.

FleetSync Decode Check Box

The **FleetSync Decode** check box is used to enable the line for radio IDs with FleetSync ANI capabilities to decode their alias, ID numbers, and messages on Telex consoles within the system. If selected, Kenwood FleetSync's over-the-air ANI is enabled and the ANI number or name is decoded via the ANI lookup tables and displayed on Telex IP based consoles.

MDC Decode Check Box

The **MDC Decode** check box is used to enable the line to receive and decode Motorola MDC signaling to display ID numbers, status IDs, emergency calls, and alerts. If selected, MDC signaling is enabled and the ID number or name is decoded via the ANI lookup tables and displayed on Telex IP based consoles.

Tone Type Drop Down Menu

The **Tone Type** drop down menu, shown in Figure 109, identifies the signaling type used when receiving a call.

Available selections for this field are: *None*, *CCIR1*, *CCIR2*, *DTMF*, *DZVEI*, *EEA*, *EIA*, *EURO*, *KENWOOD 5TONE*, *MODAT*, *NATEL*, *PCCIR*, *PDZVEI*, *PZVEI*, *ZVEI1*, and *ZVE12*.

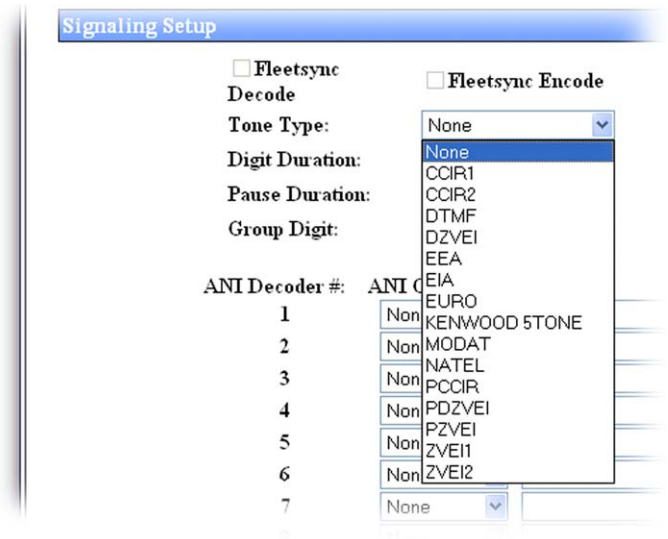

FIGURE 109. Tone Type Drop Down Menu

ANI Suffix Field

The **ANI Suffix** field identifies a 0 to 3-digit suffix appended to the end of the ANI received. For example, if you have a suffix 123 and the ANI 9876 is received, the IP-223 sends 9876123 to the consoles. This is useful if two different lines have duplicate ANI IDs.

Digit Duration Field

The **Digit Duration** field identifies the length of time, *in ms*, the digit tone is decoded when it is active for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Interdigit Duration Field

The **Interdigit Duration** field identifies the length of time, in ms, between the digit tones for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

NOTE: Some radio systems require an extended first tone, to allow time to activate the receivers.

Pause Duration Field

The **Pause Duration** field identifies the length of time, in ms, allowed between received groups for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Preamble Duration Field

The **Preamble Duration** field identifies the length of time, in ms, the first tone is sent for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Group Digit Field

The **Group Digit** field identifies the group digit. The group digit is a wild card that represents any digit. Placing a group digit within a filter allows any digit appearing at that location in the tone string to pass through the filter.

Field values can be *0 - 9 or A - F. The default is A.*

Repeat Digit Field

The **Repeat Digit** field identifies the digit that separates two digits sent back to back. On occasion, radio system messages require two of the same digits to be entered back to back. Use of repeat digits delimits tone duration ensuing continuous transitions.

The default for this field is *E.*

ANI Decoder Field

The **ANI Decoder #** field labels the row of the ANI Call you are formatting.

ANI Call Type Drop Down Menu

The **ANI Call Type** drop down menu, shown in Figure 110, identifies the type of call for the ANI decoder number entered in the ANI Call Format Field.

Available selections for this field are: *Emergency, Group, Individual*, or *Status*.

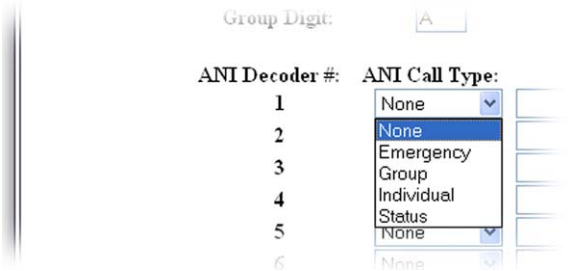

FIGURE 110. ANI Call Type Drop Down Menu

ANI Call Format Field

The **ANI Call Format** field, identifies the call string format for the ANI Decoder #.

This field can contain up to *16 digits*,

ANI Call formats include digits 0 - 9, A-D (A-F for other formats), *, # and the following characters:

I (Caller ID) – Placed into the ID field of the ANI packet or the ANI field of the caller portion of the telegram. The ID is stored as a 32-digit string in the packet.

G (Group Digits) – Stored in the Group section of the ANI packet. The group value is converted to a decimal number and is stored as an 8-digit string in the packet.

S (Status) – Digits represented by S are interpreted as status information. These values are converted to decimal numbers and stored as an 8-digit status string in the ANI packet. The console has a corresponding list of the status numbers and descriptions that are displayed upon receipt of the packet.

P (Pause) – When inserted into the string, a pause is expected in this location. The pause duration is set in the Pause Duration field (see “Pause Duration Field” on page 67).

R (Calling ID) – Used to delineate the location of the digits being used for a selective call. These digits represent the address or ID of the person being called. They are stored in the ANI packet as an 8-digit string.

Per Line Setup Window—iDEN Radio Configuration

The **Per Line Setup** window for **iDEN Radio** configuration, see Figure 111, appears when iDEN is selected from the Line Type drop down menu on the Multicast Address Setup window. In iDEN mode, the following options are available for per line configuration. DEN operation and field programming, download the NI-223 manual at www.telex.com/radio dispatch.

For more information on iDEN operation and field programming, download the NI-223 manual from www.telex.com/radiodispatch.

FIGURE 111. Per Line Setup - iDEN Radio Mode (view 1)

Delay Setup

TX Delay Field

The **TX Delay** field identifies the delay, in ms, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0 to 2000ms*.

RX Delay Field

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a LAM or COR, triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables using LAM or COR.

The range for this field is *0 to 1000ms*.

Squelch Tail Delay Field

The **Squelch Tail Delay** field identifies the amount of time, in ms, the RX audio is muted after PTT occurs. This provides the ability to overcome squelch tail ping-pong in crosspatch modes by muting the radio RX input after PTT occurs.

The range for this field is *0* to *5000*.

Function Tone Setup

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select (in groups of 10) function tones to view and modify.

1. From the Jump To drop down menu, select the **group of 10 function tones** you want to view.
2. Click **Update**.
   The function tones you select appear.

Update Button

The **Update** button searches and displays the selection you chose from the Jump To drop down list.

Tone Enable Check Box

The **Tone Enable** check box indicates whether or not the function tone is active. If selected, the function tone is active. The frequency for the tone is set on the Tone Frequency and Durations window described on page 114. The standard function tones and their frequencies are the default entries. These entries are shown in Table 7 on page 114.

NOTE: At least one function tone must be selected.

Relay Drop Down Menu

The **Relay** drop down menu, shown in Figure 112, identifies the relay(s), if any, closed immediately upon receipt of the function tone.

Available selections for this field are: *no selection*, *R01*, *R02*, or *BOTH*.

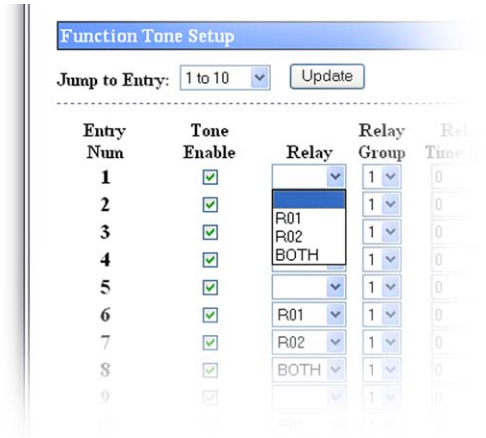

FIGURE 112. Relay Drop Down Menu-Per Line Setup

Relay Group Drop Down Menu

The **Relay Group** drop down menu identifies if a relay is grouped into separate functions. This allows more than one (1) relay to be activated at any particular time by being in separate groups.

For example, when F1 has R1 selected as its relay, and F2 has R2 selected as its relay, setting the two (2) Relay Group numbers to the same value allows multiple relays with different functions. In this scenario, the relays for F1 and F2 are interlocked. When the Relay Group assigned to F1 and F2 are different, R2 does not activate when F1 is received. Furthermore, when there is no relay selected for a function tone, but the assigned relay group is used by another relay group, when the function tone is received, all relays in the group are activated. This allows relay R1 and R2 to be assigned to different groups and use other function tones within the same relay group to activate them.

Select either *1* or *2* from the drop down menu.

Relay Time (ms) Field

The **Relay Time (ms)** field identifies if the selected relay(s) latch ON when the function tone is received, or if the selected relay(s) is latched ON for a specified period of time when the function tone is received. To program the relay(s) to latch ON when the function tone is received, enter a zero (0) in the field. To set the duration the relay(s) is latched ON, enter the desired amount of time, in ms, in the field.

The range for this field is *0 to 32000*. H=high (on), L=low (off)

Call Type Drop Down Menu

The **Call Type** drop down menu, shown in Figure 113 identifies the iDEN radio call type.

Available selections for this field are: *Direct Connect, Group Call, Call Alert, or Emergency Group Call.*

FIGURE 113. Call Type Drop Down Menu - iDEN Mode

iDEN Number Field

The **iDEN Number** field is used to enter the iDEN ID number for the function tone setup. Consult the manufacturer's technical data for ID formatting guidelines.

This field can contain up to *17 characters*.

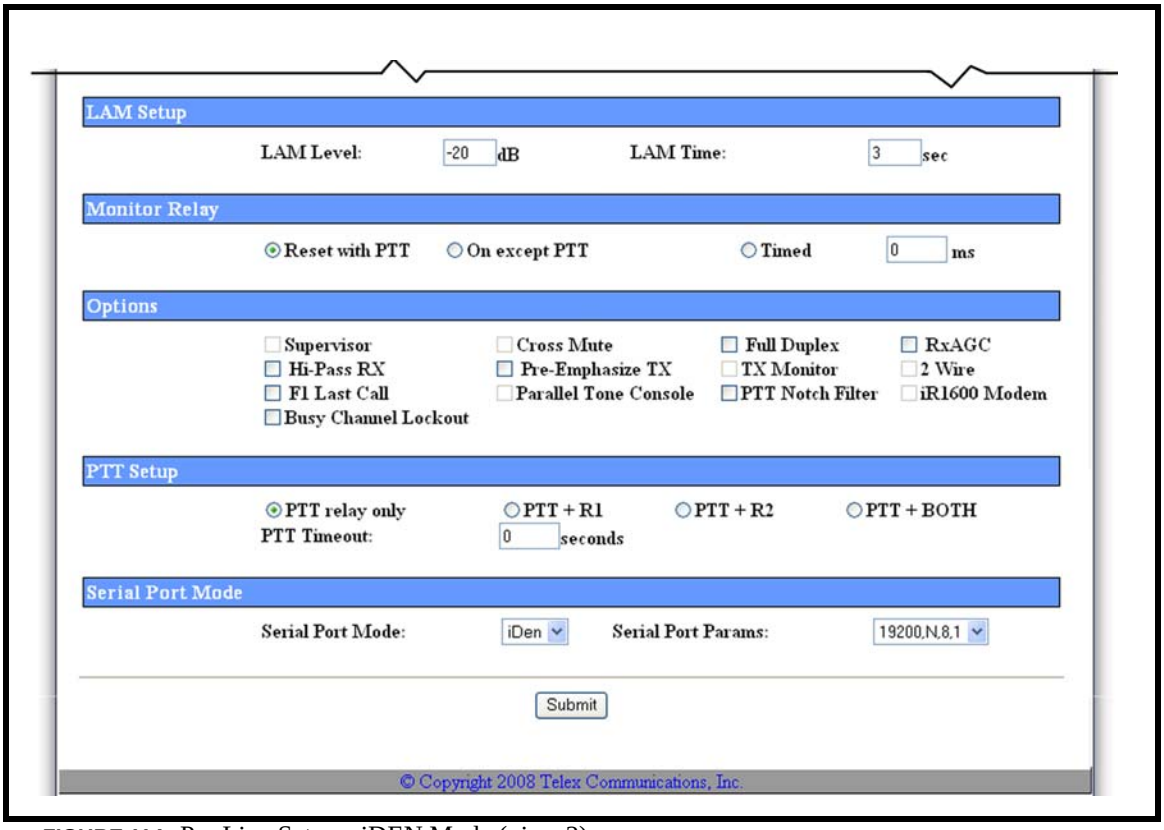

FIGURE 114. Per Line Setup - iDEN Mode (view 2)

LAM Setup

LAM Level Field

The **LAM Level** field identifies the threshold, in dB, at which the radio/line unmutes and sends RX packets to the Ethernet.

The range for this field is *-50* to *+10dB.*

LAM Time Field

The **LAM Time** field identifies the amount of time, in seconds, the console continues to play audio when receiving audio above the LAM threshold specified in the LAM Level field. This entry is also used by the Ethernet to determine how long to send audio.

The range for this field is *0* to *60 sec*.

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay-contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission (required by FCC regulations on stations equipped with CTCSS).

Select one of the following operating modes for the monitor relay:

Reset with PTT – When selected, the monitor relay is closed from the time the monitor tone sequence is received until the next PTT operation.

On except PTT – When selected, the monitor relay is latched at all times except when PTT is active, whether the monitor function tone is received or not.

Timed – When selected, enter the amount of time, in ms, the monitor relay is latched.

Options

If an **Options** field cannot be selected, the particular option is not available for the line number to which the details on the window apply.

Full Duplex Check Box

The **Full Duplex** check box indicates whether or not full duplex Ethernet is supported. If selected, full duplex (TX and RX transmission) audio packets are allowed.

RxAGC Check Box

The **RxAGC** (Automatic Gain Control) check box indicates whether or not the radio RX audio includes an AGC. If selected, an AGC step is added to the radio RX audio. This results in the transmission of a more consistent radio RX audio by increasing the level of low audio and decreasing the level of loud audio.

Hi-Pass RX Check Box

The **Hi-Pass RX** check box indicates whether or not RX audio below 300Hz is blocked. If selected, RX audio below 300Hz is blocked.

Pre-Emphasize TX Check Box

The **Pre-Emphasize TX** check box indicates whether or not TX audio includes a standard 6dB octave pre-emphasis. If selected, a standard 6dB octave pre-emphasis is included in the TX audio.

F1 Last Call Check Box (iDEN Mode only)

The **F1 Last Call** check box indicates whether or not the last call is reserved for the F1 button. If selected, function tone 1 is reserved for the last call. This allows the console operator to call back the last call received.

PTT Notch Filter Check Box

The **PTT Notch Filter** checkbox, when selected, indicates the 2175Hz notch filter is bypassed. When selected, 2175Hz ±180Hz frequency range is ignored during PTT. Use this option when 2175Hz is blocking desirable audio.

Busy Channel Lockout Check Box

The **Busy Channel Lockout** check box indicates outgoing FleetSync messages are placed in queue until the radio is idle. FleetSync messages can be lost when sent on half-duplex radios. Selecting this check box avoids lost messages.

PTT Setup

The **PTT Setup** section allows a secondary external function to be controlled with a separate relay closure at the same time as the PTT relay. Select one of the following:

PTT relay only – When selected, only the PTT relay is closed. (Default Setting)

PTT + R1 – When selected, both the PTT relay and the R1 relay close at the same time.

PTT + R2 – When selected, both the PTT relay and the R2 relay close at the same time.

PTT + BOTH – When selected, the PTT relay, the R1 relay, and the R2 relay close at the same time.

PTT Timeout Field

The **PTT Timeout** field is used to configure the length of time in seconds the IP-223 allows the radio to key up. This function is used to prevent an extensive occupation of the interfaced radio.

The range for this field is *0* to *1800sec*. To disable this feature, enter *zero (0)*.

Serial Port Mode

Serial Port Mode Drop Down Menu

The **Serial Port Mode** drop down menu is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The Freq Scan List function synchronizes the console scan list with the radio's can list.

The serial port in iDEN mode is, by default, *iDEN*.

Serial Port Parameters Drop Down Menu

The **Serial Port Params** drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits.

The default setting for the field, *19200.N.8.1*, is not configurable.

Per line Setup Window—Tetra Radio Configuration

The **Per Line Setup** window for **Tetra Radio** configuration, see Figure 115, appears when Tetra is selected from the Line Type drop down menu on the Multicast Address Setup window. In Tetra mode, the following options are available for per line configuration.

FIGURE 115. Per Line Setup - Tetra Mode (view 1)

Function Tone Setup

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select (in groups of 10) function tones to view and modify.

1. From the Jump To drop down menu, select the **group of 10 function tones** you want to view.
2. Click the **Update** button.
   The function tones you select appears.

Update Button

The **Update** button searches and displays the selection you chose from the Jump To drop down list.

Tone Enable Check Box

The **Tone Enable** check box indicates whether or not the function tone is active. If selected, the function tone is active. The frequency for the tone is set on the Tone Frequency and Durations window described on page 112. The standard function tones and their frequencies are the default entries. These entries are shown in Table 7 on page 114.

NOTE: At least one (1) function tone must be selected.

Relay Drop Down Menu

The **Relay** drop down menu identifies the relay(s), if any, closed immediately upon receipt of the function tone.

Available selections for this field are: *no selection, R01, R02,* or *BOTH.*

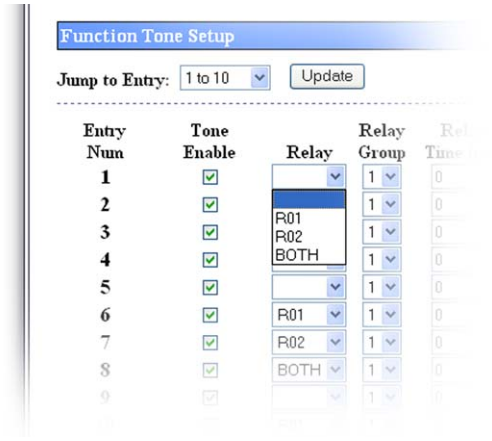

FIGURE 116. Relay Drop Down Menu

Relay Group Drop Down Menu

The **Relay Group** drop down menu identifies if a relay is grouped into separate functions. This allows more than one (1) relay to be activated at any particular time by being in separate groups. For example, when F1 has R1 selected as its relay, and F2 has R2 selected as its relay, setting the two (2) Relay Group numbers to the same value allows multiple relays with different functions. In this scenario, the relays for F1 and F2 are interlocked. When the Relay Group assigned to F1 and F2 are different, R2 does not activate when F1 is received. Furthermore, when there is no relay selected for a function tone, but the assigned relay group is used by another relay group, when the function tone is received, all relays in the group are activated. This allows relay R1 and R2 to be assigned to different groups and use other function tones within the same relay group to activate them.

Select either *1* or *2* from the drop down menu.

Relay Time (ms) Field

The **Relay Time (ms)** field identifies if the selected relay(s) latch ON when the function tone is received, or if the selected relay(s) is latched ON for a specified period of time when the function tone is received. To program the relay(s) to latch ON when the function tone is received enter a zero (0) in the field. To set the duration the relay(s) is latched ON, enter the desired amount of time, in ms, in the field.

The range for this field is *0* to *32000*ms.

Type Drop Down Menu

The **Type** drop down menu, shown in Figure 117 identifies the type of call for Sepura radio configuration.

Trunked GC (Group Call) – A half duplex point-to-multi-point call where immediate communication takes place between the calling and the called users.

Trunked HDPC (Half Duplex Private Call) – A half duplex point-to-point call between caller and called units. Each unit asks permission to transmit before each transaction.

Trunked UDSL (User Defined Scan List) – A scan of specific groups predefined in the radio and in the IP-223. A UDSL is a collection of pre-defined talk group (or function tone) settings. The UDSL string entered in the ISSI/GSSI Number field is separated by the semicolon. It can accept up to 10 trunked groups.

Direct GC – Communication with other TETRA radios without the use of the network. This is called **DMO** (Direct Mode Operation).

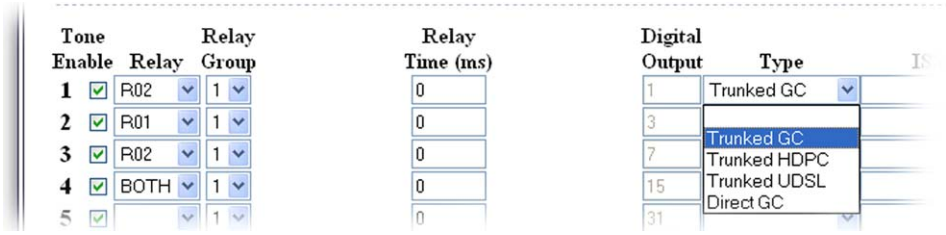

FIGURE 117. Type Drop Down Menu - Tetra Mode

NOTE: For more information on TETRA operation and field programming, download the Sepura Application Note at www.telex.com/radiodispatch

ISSI/GSSI Number Field

The **ISSI/GSSI Number** field identifies the group number or unit number for the selected Sepura radio type.

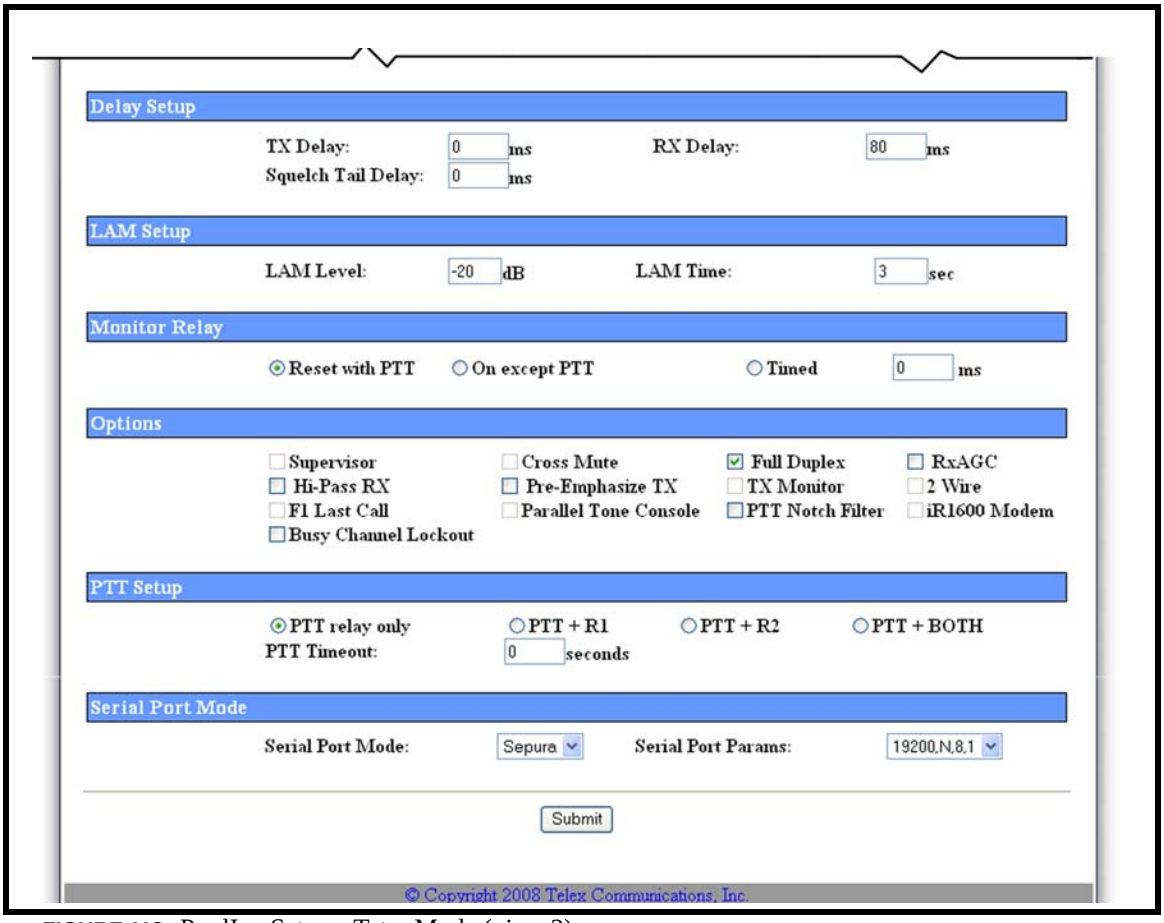

FIGURE 118. Per lIne Setup - Tetra Mode (view 2)

Delay Setup

TX Delay Field

The **TX Delay** field identifies the delay, in ms, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0* to *2000ms*.

RX Delay Field

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a LAM or COR triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables using LAM or COR.

The range for this field is *0* to *1000ms*.

LAM Setup

LAM Level Field

The **LAM Level** field identifies the threshold, in dB, at which the radio/line un-mutes and sends RX packets to the Ethernet.

The range for this field is *-50* to *+10dB.*

LAM Time Field

The **LAM Time** field identifies the amount of time, in seconds, the console continues to play audio when receiving audio above the LAM threshold specified in the LAM Level field. This entry is also used by the Ethernet to determine how long to send audio.

The range for this field is *0* to *60 sec*.

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay-contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission (required by FCC regulations on stations equipped with CTCSS). Select one of the following operating modes for the monitor relay:

Reset with PTT – When selected, the monitor relay is closed from the time the monitor tone sequence is received until the next PTT operation.

On except PTT – When selected, the monitor relay is latched at all times except when PTT is active, whether the monitor function tone is received or not.

Timed – When selected, enter the amount of time, in ms, the monitor relay is latched.

Options

If an **Options** field cannot be selected, the particular option is not available for the line number to which the details on the window apply.

Full Duplex Check Box

The **Full Duplex** check box indicates whether or not full duplex Ethernet is supported. If selected, full duplex (TX and RX transmission) audio packets are allowed.

RxAGC Check Box

The **RxAGC** check box indicates whether or not the radio RX audio includes an AGC. If selected, an AGC step is added to the radio RX audio. This results in the transmission of a more consistent radio RX audio by increasing the level of low audio and decreasing the level of loud audio.

Hi-Pass RX Check Box

The **Hi-Pass RX** check box indicates whether or not RX audio below 300Hz is blocked. If selected, RX audio below 300Hz is blocked.

Pre-Emphasize TX Check Box

The **Pre-Emphasize TX** check box indicates whether or not TX audio includes a standard 6dB octave pre-emphasis. If selected, a standard 6dB octave pre-emphasis is included in the TX audio.

PTT Notch Filter Check Box

The **PTT Notch Filter** checkbox, when selected, indicates the 2175Hz notch filter is bypassed. When selected, 2175Hz ±180Hz frequency range is ignored during PTT. Use this option when 2175Hz is blocking desirable audio.

Busy Channel Lockout Check Box

The **Busy Channel Lockout** check box indicates outgoing FleetSync messages are placed in queue until the radio is idle. FleetSync messages can be lost when sent on half-duplex radios. Selecting this check box avoids lost messages.

PTT Setup

The **PTT Setup** section allows a secondary external function to be controlled with a separate relay closure at the same time as the PTT relay. Select one of the following:

PTT relay only – When selected, only the PTT relay is closed. (Default Setting)

PTT + R1 – When selected, both the PTT relay and the R1 relay close at the same time.

PTT + R2 – When selected, both the PTT relay and the R2 relay close at the same time.

PTT + BOTH – When selected, the PTT relay, the R1 relay, and the R2 relay close at the same time.

PTT Timeout Field

The **PTT Timeout** field is used to indicate how long, in seconds, to allow PTT to be active when no audio is transmitted. If a time is entered in the field, PTT activity will timeout when no audio is transmitted for the designated amount of time. This feature is useful in cases where the line goes offhook for an indefinite period of time due to a stuck PTT key.

The range for this field is *0* to *1800sec*. To disable this feature, enter zero (0)

Serial Port Mode

Serial Port Mode Drop Down Menu

The **Serial Port Mode** drop down menu is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The Freq Scan List function synchronizes the console scan list with the radio's scan list.

The serial port in Tetra mode is, by default, *Sepura*. For more information see the manufacturer's technical documentation.

Serial Port Parameters Drop Down Menu

The **Serial Port Params** drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits.

The default setting for the field, *19200.N.8.1*, is not configurable.

Save to EEPROM Window

The Save to EEPROM window is used to save the current configuration to the IP-223 or to reset the parameters on the configuration webpage to the last configuration saved to the IP-223.

NAVIGATION: Clicking **Save to EEPROM** displays the Save Parameters and Reset IP-223 command buttons, shown in Figure 119

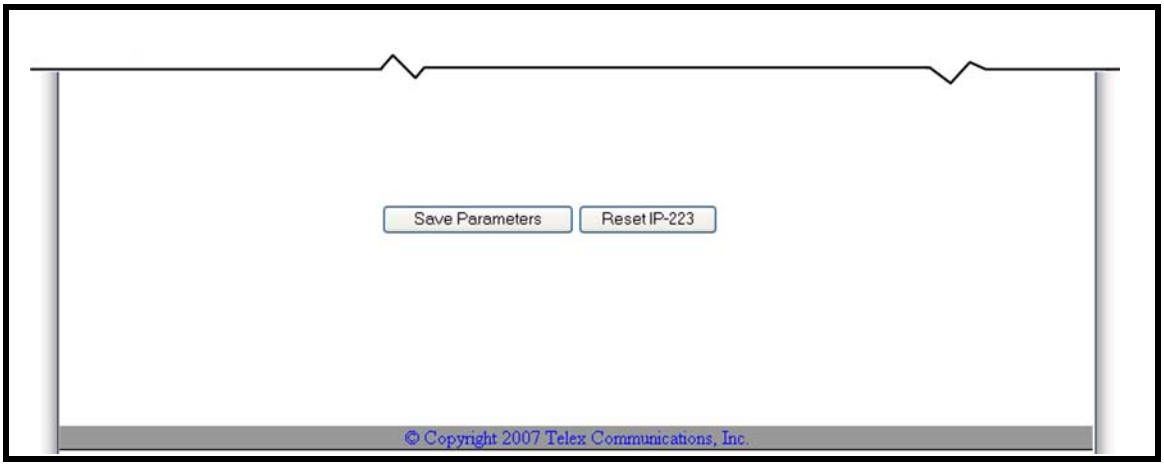

FIGURE 119. Save to EEPROM

Save Parameters Button

The **Save Parameters** button is used to save any changes submitted to the IP-223 for storage into permanent memory.

Reset IP-223 Button

The **Reset IP-223** button is used to perform a full reset of the IP-223. This is the software version of a power down reset.

To **save changes to permanent memory**, do the following:

1. From the links, select **Save to EEPROM**.
   The Save Setup Parameters window appears.
2. Click **Save Parameters**.
   The parameters are saved to permanent memory.

NOTE: If the Submit button on an individual setup window was not selected before moving to another window, any changes made to the entries on the window are not saved to permanent memory even when the Save Parameters Button is selected.

To **reset the IP-223**, do the following:

1. From the links, select **Save to EEPROM**.
   The Save Setup Parameters window appears.
2. Click **Reset IP-223.**
   A momentary loss of connectivity occurs and the window shown in Figure 120 appears. The connection is restored after several seconds.
3. Click a **link** to access a setup window, otherwise close the web browser.

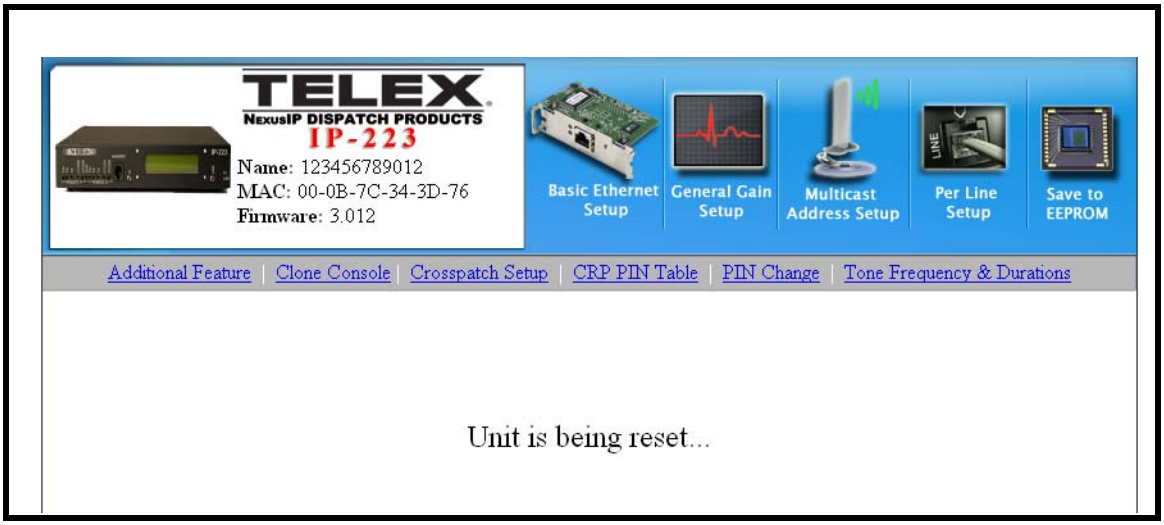

FIGURE 120. Reset IP-223

Account Setup Window

The Account Setup window allows you to manage system and user accounts. The fields on this window are described on the following pages.

NAVIGATION: Clicking **Account Setup** displays the Account Setup window shown in Figure 126.

System Accounts

By default, the IP-223 comes with two (2) **system accounts** created: *admin* and *user*. Upon first use, there are no passwords set for either account. You can change the passwords for both of the accounts, if desired. These are the only system accounts allowed.

Admin System Account

The **Admin System** account has privileges to change, modify or delete anything within the IP-223 software configuration. The account rights are not configurable, except for the password.

User System Account

The **User System** account is used to is used to manage the system user account password. The system user account is in edit mode when the username field is highlighted yellow.

Created Accounts

Created accounts are user-defined accounts that may have different defined permissions to selected areas of the IP-223 configuration software. You can create up to five (5) accounts of this type. To create a user defined account, see “Add New User Button” on page 94.

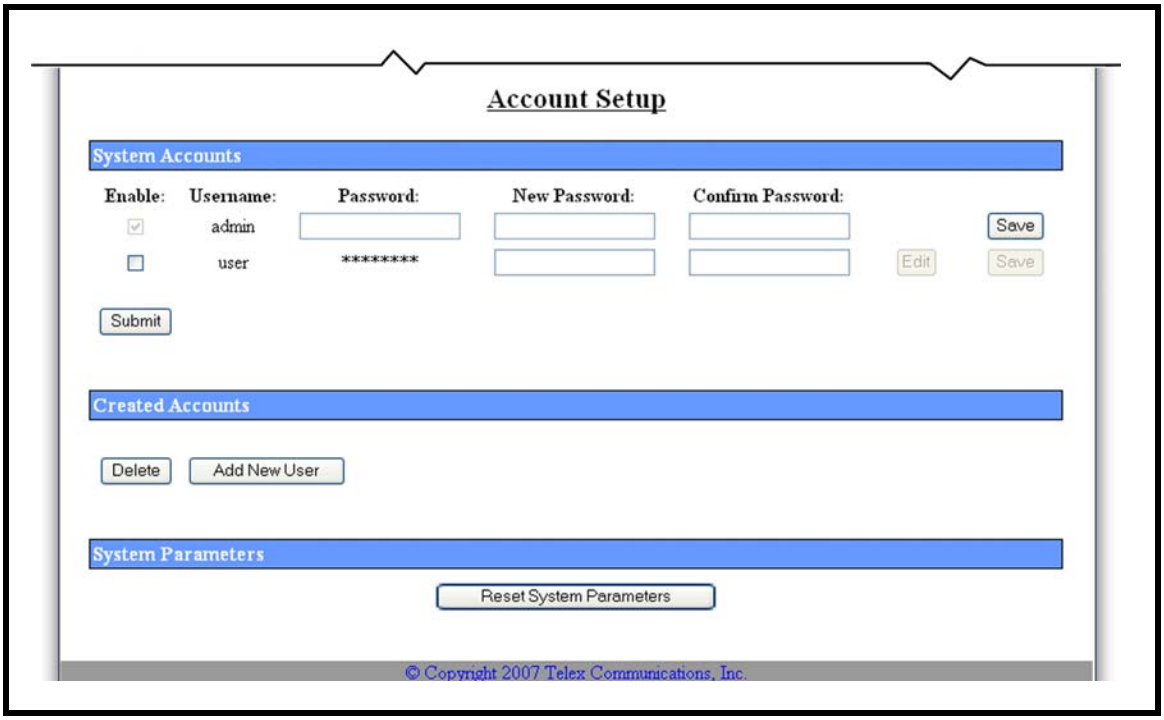

FIGURE 121. Account Setup

System Accounts

Enable Check Box

The **Enable** check box indicates whether the username is active or not. When selected, the username is active.

NOTE: The admin system account is always enabled.

Username Display Column

The **Username** display column displays the username of the system account. This field is not configurable.

Password Field

The **Password** field displays the password for the system account. The password is shown in asterisks (******) for security purposes.

The range for this field is a *4–16 character* alphanumeric password.

New Password Field

The **New Password** field is used to enter a new password for the system account.

The range for this field is a *4–16 character* alphanumeric password.

Confirm Password Field

The **Confirm Password** field is used to confirm the password you entered in the New Password field. This password must match the password entered in the New Password field.

Edit Button

The **Edit** button is used to make changes to the user system account password. The edit button is inactive until the user account is enabled.

To **enable the user account**, do the following:

1. Select the **enable check box** next to the account,
2. Click **Submit**.
   The edit button becomes active.

   NOTE: The only configurable fields are the New Password field and the Confirm Password field. Also, when the Edit window is open, a Set No Password check box appears. For more information, see "Edit System Accounts Window" on page 94.

Save Button

The **Save** button is used to temporarily save the change you have made to the system account. You must click the Submit button to save the change made to the console.

Remember, you must Submit the changes to the console, too. The data is not stored in permanent memory until it is saved, as explained in "Save Parameters Button" on page 90.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223. The submit button saves changes in temporary memory only.

To **permanently save changes,** do the following:

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console

Created Accounts

Delete, Username, Password, New Password, Confirm Password Display Columns

The **Delete**, **Username**, **Password**, **New Password**, **Confirm Password** display columns display the existing user accounts (up to 5) you have created.

NOTE: Under the Delete column, a check box is shown. If the check box is selected, the account is marked for deletion.Click the **Delete** button to delete the user account. The deletion is not complete until it is saved, as explained in "Save Parameters Button" on page 90.

Delete Button

The **Delete** button is used to delete the selected user account(s). User accounts are marked for deletion by selecting the Delete check box.

Add New User Button

The **Add New User** button opens the Create New User window. From this window, you can create a user profile with selectable permissions. For more information, see “Add New User Window” on page 96.

System Parameters

Reset System Parameters Button

The **Reset System Parameters** button resets all parameters in the IP-223 to their factory defaults.

Edit System Accounts Window

The **Edit System Account** window, shown in Figure 122, is used to edit the user system account. When the Edit button is selected, the user system account becomes highlighted in yellow. You can only change the Password or set the account to have No Password from this window.

NAVIGATION: Clicking the **Edit** button displays the Edit System Account window shown in Figure 122.

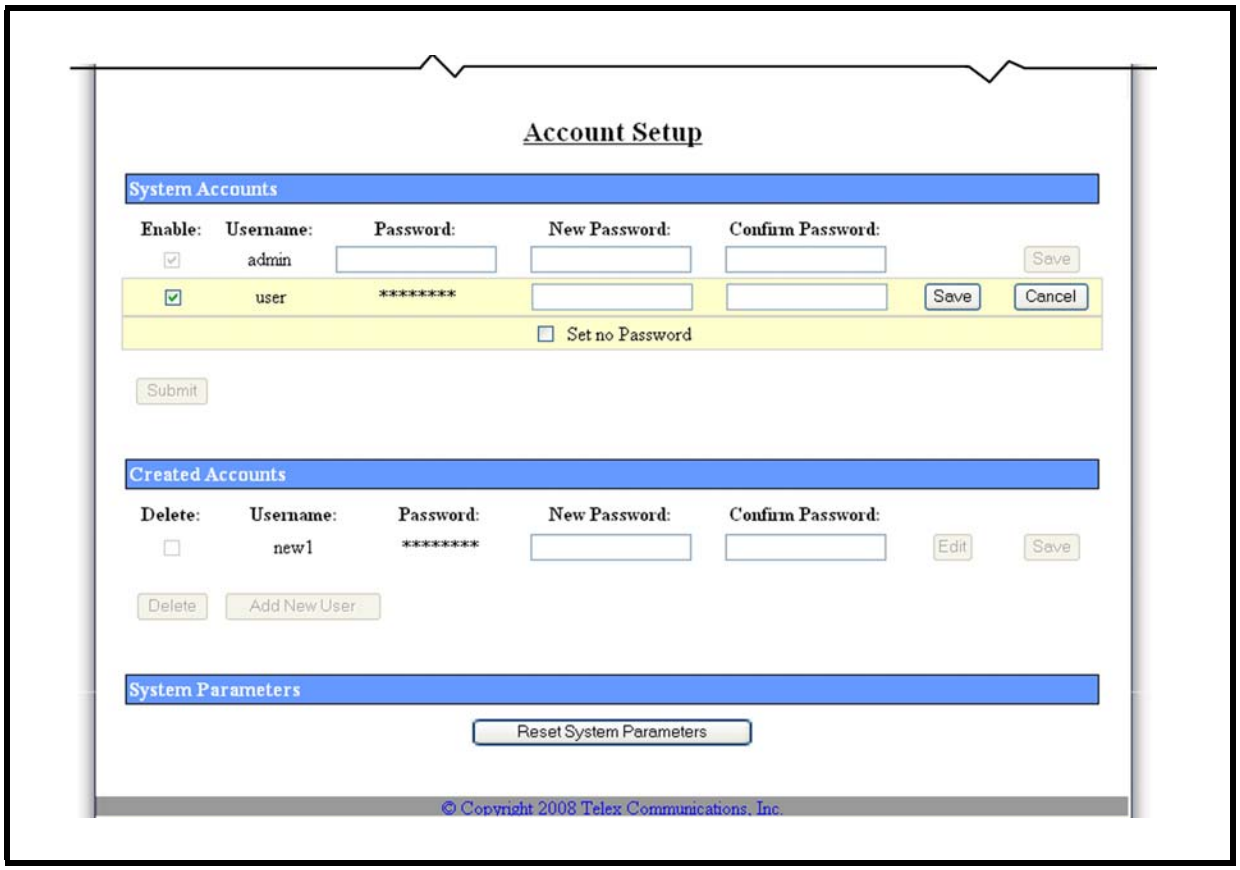

FIGURE 122. Edit System Account

Once you have made the change to the user system account, the following message appears at the top of the Account Setup window.

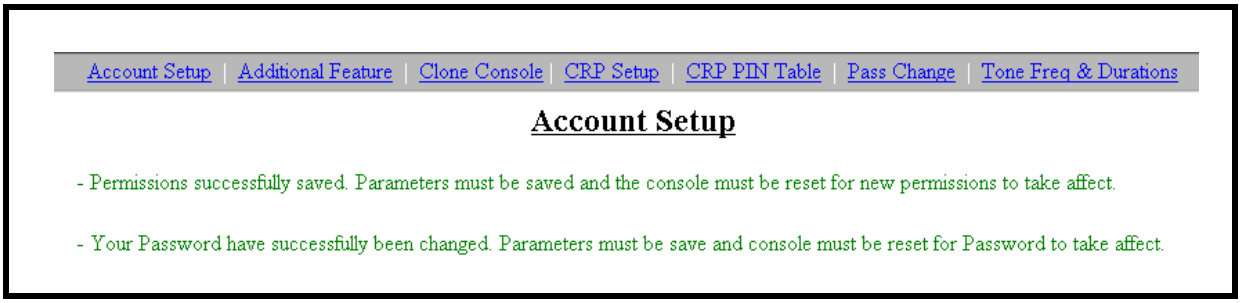

FIGURE 123. Success Message

NOTE: The information is not stored in permanent memory until it is saved, as explained in “Save Parameters Button” on page 90

To **change the admin System Account Password**, do the following:

1. In the Current Password field, enter the **current password** (if this is the first time you are changing the password, leave the field blank).
2. In the New Password field, enter a **new password**.
   The password can be 4-16 alpha-numeric characters in length.
3. In the Confirm Password field, enter the **password** again.
4. Click **Save**.
5. Click the **Save to EEPROM** link at the top of the page.
   The Save to EEPROM window appears.
6. Click **Save Parameters** to save the changes to the IP-223.

   NOTE: To change the system account password from an actual password to no password, leave the New Password and Confirm password fields blank, and then press Save.

To **change the user system account password or edit the account**, do the following:

1. Select the **Enable** check box next to the *user* username.
2. Click **Submit**.
   Once enabled, the New Password, Confirm Password fields, Edit and Save buttons become active.
3. In the New Password field, enter a **new password**.
   The password can be 4-16 alpha-numeric characters in length.
4. In the Confirm Password field, enter the **password** again.
5. Click **Save**.
6. Click the **Save to EEPROM** link at the top of the page.
   The Save to EEPROM window appears.
7. Click **Save Parameters** to save the changes to the IP-223.104

Add New User Window

The **Create New User** window is used to create up to five (5) new user account. From this window, you can assign permissions to certain users. The fields for this window are described on the following pages.

NAVIGATION: Selecting the **Add New User** button from the Account Setup window opens the Add New User window, see Figure 124.

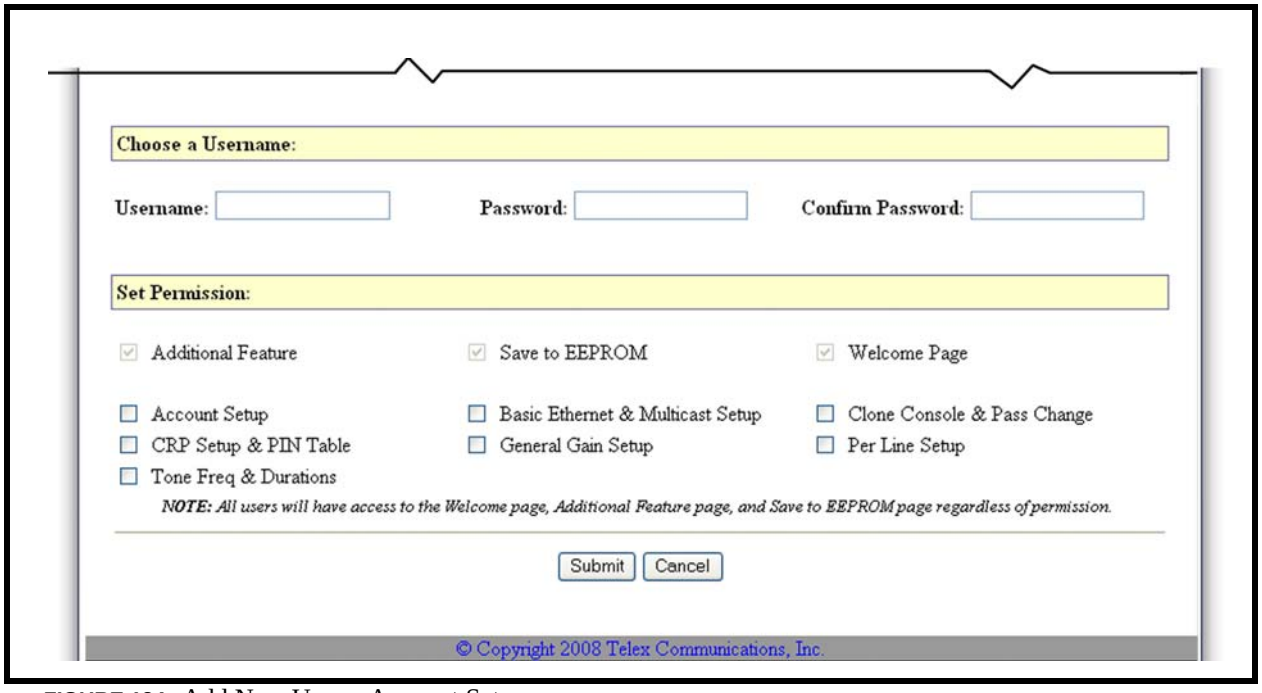

FIGURE 124. Add New User—Account Setup

Choose a Username

Username Field

The **Username** field identifies the username of the account you are creating.

This field can contain up to *16 alphanumeric characters*.

Password Field

The **Password** field identifies the password required to logon to this user account.

The range for this field is a *4–16 alphanumeric* password.

Confirm Password Field

The **Confirm Password** field is used to confirm the password you entered into the Password field. This password must match exactly with the Password field entry.

Set Permissions

Additional Feature Check Box

The **Additional Feature** check box indicates access is granted to make changes to the Additional Feature page. This permission is automatically granted to every user and is not configurable.

Save To EEPROM Check Box

The **Save to EEPROM** check box indicates permission is granted to use the Save to EEPROM page. By default, permission to change configurations in this window is granted on every created account. See “Save to EEPROM Window” on page 90, for more information.

Welcome Page Check Box

The **Welcome Page** check box indicates permission is granted to change the name of the console’s welcome window. By default, permission to change the name of this window is granted on every created account. See “Welcome Window” on page 42, for more information.

Account Setup Check Box

The **Account Setup** check box indicates access is granted to the Account Setup window.

Basic Ethernet & Multicast Setup Check Box

The **Basic Ethernet Setup** check box indicates permission is granted to the Basic Ethernet Setup and Multicast Address Setup windows where changes can be made by the user. See “Basic Ethernet Setup Window” on page 43, and “Multicast Address Setup Window” on page 49 for more information.

Clone Console & Pass Change Check Box

The **Clone Console & Pass Change** check box indicates permission is granted to the Clone Console and Pass Change windows where changes can be made by the user. See “Clone Console Window” on page 101, and “Pass Change Window” on page 111 for more information.

CRP Setup & PIN Table Check Box

The **CRP Setup & PIN Table** check box indicates access is granted to make changes to the CRP Setup and PIN Table pages. When enabled, users are able to make changes to these pages.

General Gain Check Box

The **General Gain** check box indicates access is granted to make changes to the General Gain page. This permission is automatically granted to every user and is not configurable.

Per Line Setup Check Box

The **Per Line Setup** check box indicates access is granted to make changes to the Per Line Setup page. When enabled, users are able to make changes to the page.

Tone Freq & Durations Check Box

The **Tone Freq & Durations** check box indicates access is granted to make changes to the Tone Freq & Durations page. When enabled, users are able to make changes to the page.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223. The Submit button saves changes in temporary memory only.

To **permanently save changes,** do the following:

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Cancel Button

The **Cancel** button discards the user account settings you have made and reopens the Account Setup window.

Edit Created Accounts Window

The **Edit Created Account** window, as seen in Figure 125, is used to edit a created account (user).

NAVIGATION: Clicking the **Edit** button for the user account displays the Edit Created Account window shown in Figure 125.

NOTE: For more information about the different permissions check box selections, see “Set Permissions” on page 97.

FIGURE 125. Edit Created Account—Account Setup

NOTE: If you do not want to have a password for the user, be sure to select the Set no PIN check box.

Once you have completed making changes, click **Save** to save the changes. Otherwise, click **Cancel** to discard the changes made.

NOTE: The information is not stored in permanent memory until it is saved, as explained in “Save Parameters Button” on page 90.

Additional Feature Setup Window

The **Additional Feature** setup window activates special features enabled by purchasing an option string from Telex. Examples of special features are Kenwood's Fleetsync and Motorola's MDC1200 Over-the-Air ANI decoder. For more information contact Telex Sales. Have the unit serial number available when purchasing this option.

NAVIGATION: Clicking **Additional Feature** displays the Additional Feature Setup window shown in Figure 126.

FIGURE 126. Additional Feature Access

To **activate a special feature**, do the following:

1. From the links, select **Additional Feature**.
   The Additional Feature Setup window appears.
2. In the enter Access Key field, enter the **16-digit option string**.
3. Click **Submit**.
   The entries currently displayed on the window are sent to the IP-223 for storage.
4. From the links, select **Save to EEPROM**.
   The Save Setup Parameters window appears.
5. Click **Save Parameters**.
   The entries are saved to permanent memory.

Clone Console Window

The **Clone System Parameters** window provides the ability to copy the setup information, other than the serial number, base IP Address and mask address from one IP-223 unit to another IP-223 unit.

NAVIGATION: Clicking **Clone Console** displays the Retrieve Configuration Data from Remote IP-223 window shown in Figure 127.

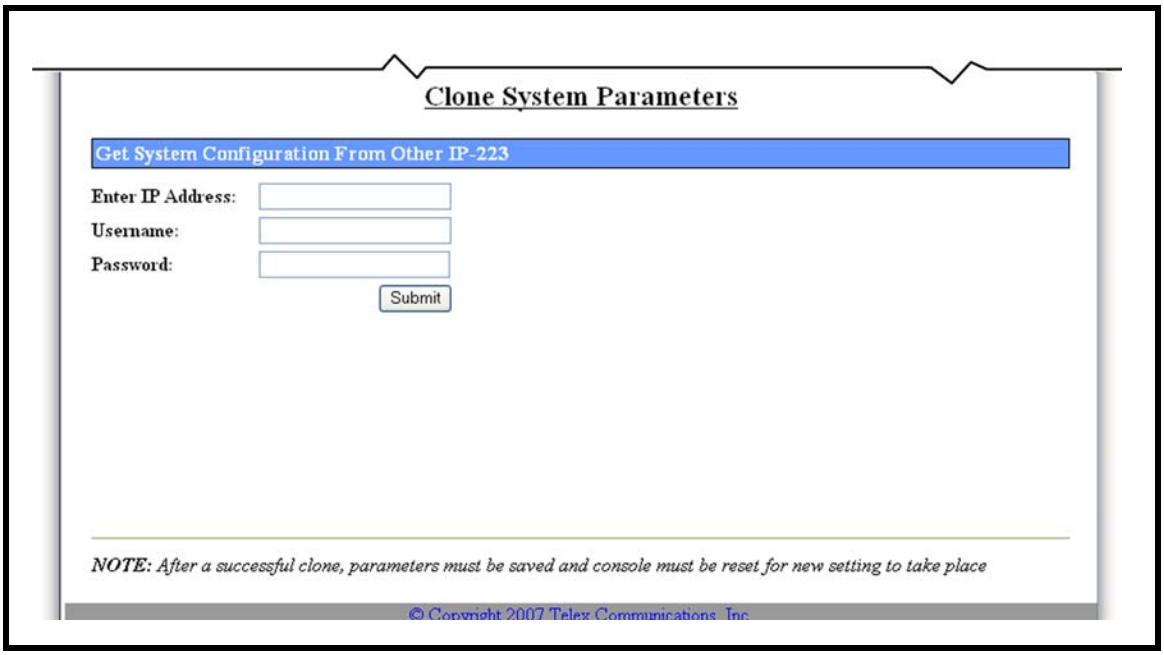

FIGURE 127. Clone System Parameters

To **copy configuration data from one IP-223 unit to another IP-223 unit**, do the following:

1. Connect both **IP-223 units** to the Ethernet network.
2. Follow the steps in **"To access the IP-223 web setup windows, do the following:" on page 39** to access the IP-223 web setup windows for the IP-223 unit the configuration data is to be copied to.
3. From the links, select **Clone Console**.
   The Retrieve Configuration Data from Remote IP-223 window appears.
4. In the Enter IP Address field, enter the **IP Address** of the remote IP-223 the configuration data is to be copied from.
5. Enter the **username and password** of the local IP-223.
6. Click **Submit**.
   The setup information, other than the serial number, base IP Address, and mask address is sent to the IP-223 for storage.
7. From the links, select **Save to EEPROM**.
   The Save Setup Parameters window appears.
8. Click **Save Parameters**.
   The entries are saved to permanent memory.

Crosspatch Setup Window

The **Crosspatch Setup** window provides the necessary parameters to connect the IP-223s together via the Ethernet network. The fields on this window are described on the following pages.

This window can contain up to *100 entries*.

NAVIGATION: Clicking **Crosspatch Setup** displays the Crosspatch Setup window shown in Figure 128.

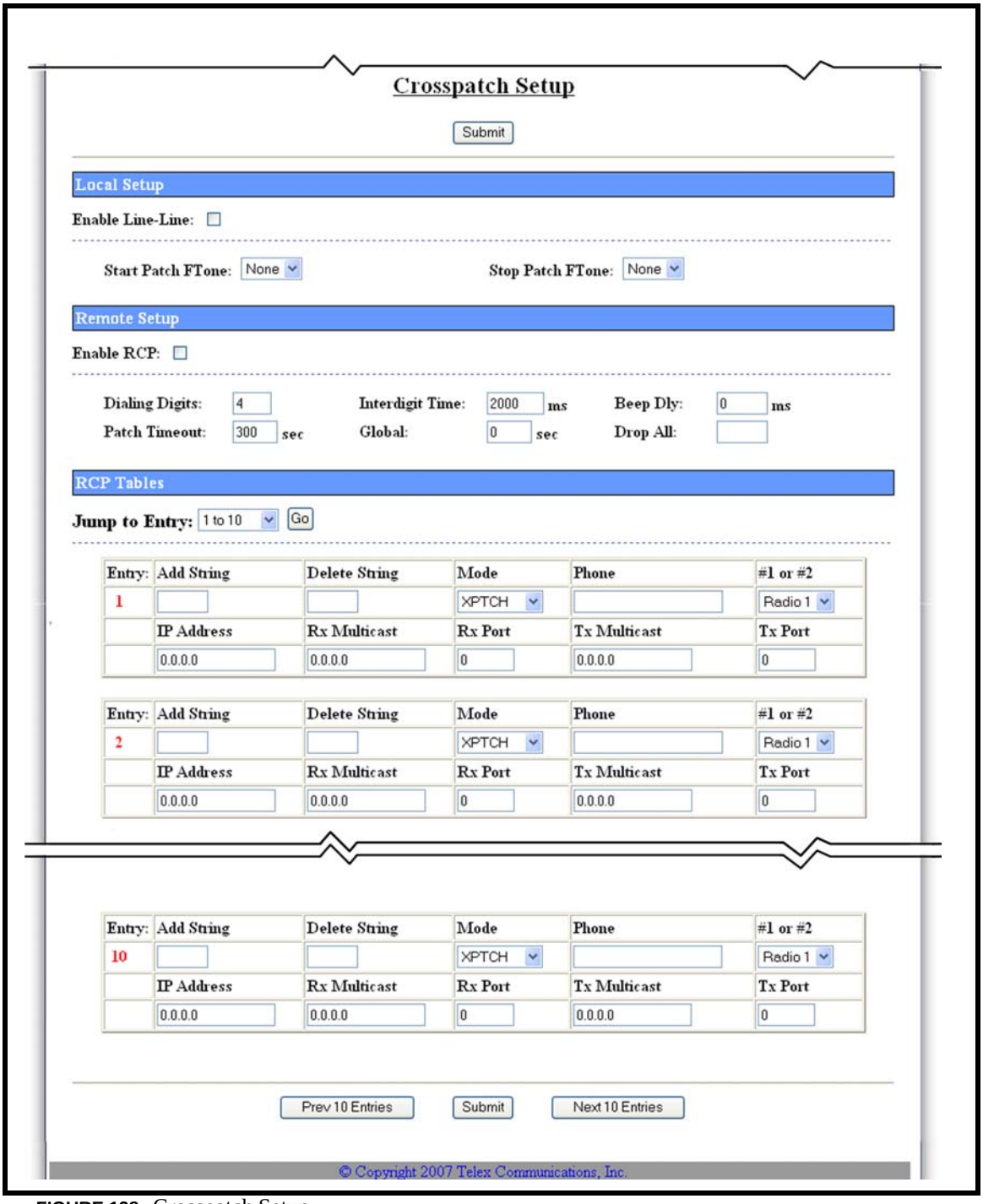

FIGURE 128. Crosspatch Setup

Local Setup

Enable Line – Line Check Box

The **Enable Line – Line** check box indicates whether or not audio can be routed from one line to another line. If selected, audio is routed from one line to the other line. TX traffic from the console overrides the crosspatch to allow the console operator to take control of the line.

Start Patch FTone Drop Down Menu

NOTE: When using the Start and Stop FTone, the Line-Line check box must NOT be selected.

The **Start Patch FTone** drop down menu identifies the Ethernet function tone selection that starts a crosspatch between line 1 and line 2.

Stop Patch FTone Drop Down Menu

The **Stop Patch FTone** drop down menu identifies Ethernet function tone selection that stops a crosspatch between line 1 and line 2.

Remote Setup

RCP Enable Check Box

The **RCP Enable** check box indicates whether or not **RCP** (Remote Crosspatch) is enabled. If selected, RCP is enabled.

Dialing Digits Field

The **Dialing Digits** field identifies the number of **DTMF** (Dual Tone Multi-Frequency) digits allowed in the Drop All, Add String, and Delete String fields on the window.

The entry can be *2, 3, or 4*.

Interdigit Time Field

The **Interdigit Time** field identifies the amount of time, in ms, allowed between DTMF digits before a reset occurs. If a reset occurs, the DTMF sequence must be started again.

This range for this field is *0* to *32000ms*

Beep Dly Field

The **Beep Dly** field identifies the amount of time, in ms, between the digit string detection and status beeps echoed back to the hand-held radio.

The range for this field is *0* to *5000ms*.

Patch Timeout Field

The **Patch Timeout** field identifies the amount of time, in seconds, allowed for inactivity on an active patch. If a patch is inactive for the specified period of time, the patch is dropped.

The range for this field is *0* to *999seconds*.

NOTE: Patch Timeout must be greater than Global Timeout.

Global Field

The **Global** field identifies the amount of time, in seconds, allowed for any patch.

The range for this field is *0* to *32000seconds*.

Drop All Field

The **Drop All** field identifies the DTMF digit sequence used to drop all current patches. The number entered must be the number of digits specified in the Dialing Digits field.

The range for this field is *0* to *9999seconds*.

RCP Tables

The required fields depend on the mode selected:

XPATCH - requires #1 or #2, IP Address, Add String and Delete String

DIAL - requires Phone, Add String and Delete String

DLVOIP - requires Rx Multicast/Port, Tx Multicast/Port, Add String and Delete String

PHONEP - requires Add String and Delete String

LPTCH - requires Add String and Delete String

RCP Tables

Jump To Entry Drop Down Menu and Go Button

The **Jump To Entry** drop down menu allows you to select (in groups of (10)) function tones to view and modify.

1. From the Jump To drop down menu, select the **entries** you want to view.
2. Click the **GO** button.
   The function tones you select appears.

Entry Field

The **Entry** field labels the row for the crosspatch entry.

Add String Field

The **Add String** field identifies the DTMF digit sequence to add this crosspatch entry. The number entered must be the number of digits specified in the Dialing Digits field.

This field can contain up to *4 digits*.

Delete String Field

The **Delete String** field identifies the DTMF digit sequence to delete this crosspatch entry. The number entered must be the number of digits specified in the Dialing Digits field.

This field can contain up to *4 digits*.

Mode Drop Down Menu

The **Mode** drop down menu identifies the crosspatch mode used for the crosspatch entry number. The crosspatch modes available are:

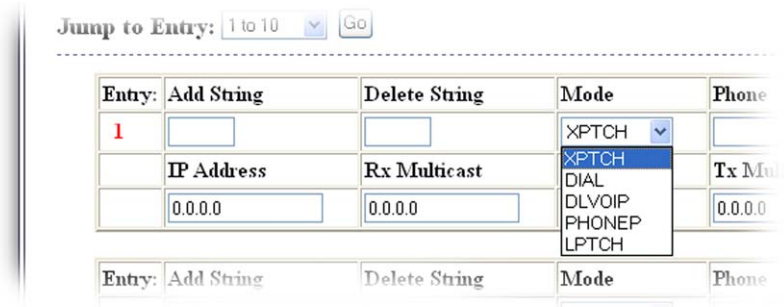

FIGURE 129. Crosspatch Setup - Mode Drop Down Menu

XPTCH – Crosspatch to a remote IP-223. the IP Address and line number is required.

DIAL – A remote user with a portable radio can key a DTMF string, causing the IP-223 to take the PIB or TDI offhook, dial a pre-programmed phone number and establish a patch between the devices.

DLVOIP – A remote user with a portable radio can key a DTMF string, causing the IP-223 to join different multicast groups and ports, which can cause mapping the IP to a different line.

PHONEP – A remote user with a portable radio can key a DTMF string, causing the IP-223 to take the PIB or TDI offhook. Once the PIB or TDI is offhook, the user can manually dial a phone number.

LPTCH – Line-to-line crosspatch. Enable and disable using DTMF strings.

Phone Field (DIAL option only)

The **Phone** field identifies the phone number to be dialed for this crosspatch entry.

This field can contain up to *21 digits*.

#1 or #2 Drop Down Menu (XPATCH option only)

The ***#1 or #2*** drop down menu identifies which DB25 connector port on the remote IP-223 is used in this crosspatch entry.

Available selections for this field are: *Radio1* or *Radio 2*.

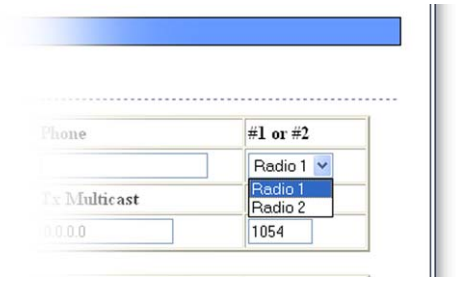

FIGURE 130. #1 or #2 Drop Down Menu-Crosspatch Setup

IP Address Field (XPATCH option only)

The **IP Address** field identifies the IP Address of the remote IP-223 with a radio used in this crosspatch entry.

Rx Multicast Field (DLVOIP option only)

The **Rx Multicast** field identifies the broadcast address for the RX audio traffic used in this crosspatch entry. To inter-operate, all consoles must have the same base Multicast Address.

The range for this field is *224.0.0.2* to *239.255.255.255*.

Rx Port Field (DLVOIP option only)

The **Rx Port** field identifies the RX port number for this crosspatch entry.

The RX port number must be unique and must be greater than 1054.

Tx Multicast Field (DLVOIP option only)

The **Tx Multicast** field identifies the broadcast address for the TX audio traffic used in this crosspatch entry. To inter-operate, all consoles must have the same base Multicast Address.

The range for this field is *224.0.0.2* to *239.255.255.255*.

Tx Port Field (DLVOIP option only)

The **Tx Port** field identifies the TX port number for this crosspatch entry.

The TX port number must be unique and must be greater than 1054.

Command Buttons

NOTE: If any changes have been made to the entries on the window, the **Submit** button must be selected before selection of any other command button on the window. If the Submit button is not selected before the selection of another command button, any changes made to the entries on the window are cleared.

Prev 10 Button

The **Prev 10** button is used to traverse the window between crosspatch entries 1 and 100.

Next 10 Button

The **Next 10** button is used to traverse the window between crosspatch entries 1 and 100.

To **define the crosspatch parameters**, do the following:

1. From the links, select **Crosspatch Setup**.
   The Crosspatch Setup window appears.
2. Select the **Line-Line Enable** check box to route audio from one line to another line.
3. From the Start Patch FTone drop down menu, select the **function tone** that starts a crosspatch between two radios.
4. From the Stop Patch FTone drop down menu, select the **function tone** that stops a crosspatch between two radios.
5. Select the **RCP Enable** check box to enable RCP.
6. In the Dialing Digits field, enter the **number of DTMF digits** allowed in the Drop All, Add String, and Delete Strings fields on the window.
7. In the Interdigit Time field, enter the **amount of time** (in ms) allowed between DTMF digits before a reset occurs.
8. In the Beep Dly field, enter the **amount of time** (in ms) between digit string detection and status beeps echoed back.
9. In the Patch Timeout field, enter the **amount of time** (in seconds) allowed for inactivity on an active patch before the patch is dropped.
10. In the Global field, enter the **amount of time** (in seconds) allowed for inactivity on all patches before all patches are dropped.
11. In the Drop All field, enter the **DTMF digit sequence** to drop all current patches.

    NOTE: The DTMF digit sequence entered must be the number of digits specified in the Dialing Digits field in step 6.
12. Complete **Entry 1** in the RCP Tables, if applicable:
13. In the Add String field, enter the **DTMF digit sequence** to add this crosspatch entry.

    NOTE: The DTMF digit sequence entered must be the number of digits specified in the Dialing Digits field in step 6.
14. In the Delete String field, enter the **DTMF digit sequence** to delete this crosspatch entry.

    NOTE: The DTMF digit sequence entered must be the number of digits specified in the Dialing Digits field in step 6.
15. From the Mode drop down menu, select the desired **crosspatch mode**.
16. In the Phone field, enter the **phone number** of the phone to be dialed.
17. From the #1 or #2 drop down menu, select the applicable **DB25 connector port** used on the remote IP-223.
18. In the IP Address field, enter the **IP Address** of the remote IP-223 with the radio used in this crosspatch entry.
19. In the Rx Multicast field, enter the **Multicast Address** for the RX audio traffic.
20. In the Rx Port field, enter a unique **RX port number**.
21. In the Tx Multicast field, enter the **Multicast Address** for the TX audio traffic.
22. In the Tx Port field, enter a unique **TX port number**.
23. When all entries in the RCP Table are complete for entry 1, repeat **steps 13 through 22 above** to complete the required remote crosspatch entries on this window.
24. If all of the remote crosspatch entries are complete on the window and more crosspatches need to be defined, click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
    OR
    If all of the remote crosspatch entries are complete on the window and no more crosspatches need to be defined, click **Submit.**
    AND
    proceed to **step 28**.
    The entries currently displayed on the window are sent to the IP-223 for storage.

25. Click **Next 10** to toggle to the next Crosspatch Setup window.
26. Complete **steps 13 through 22** for all desired crosspatch entries on the window.
27. After all crosspatches have been entered, click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
28. From the links, select **Save to EEPROM**.
    The Save Setup Parameters window appears.
29. Click **Save Parameters**.
    The entries are saved to permanent memory.

CRP PIN Table Window

The **Remote CrossPatch Pin Setup** window allows up 300 PIN numbers to be set for operation of the IP-223's crosspatch feature. The fields on this window are described on the following pages.

NAVIGATION: Clicking **CRP PIN Table** displays the Remote Crosspatch Pin Setup window shown in Figure 131.

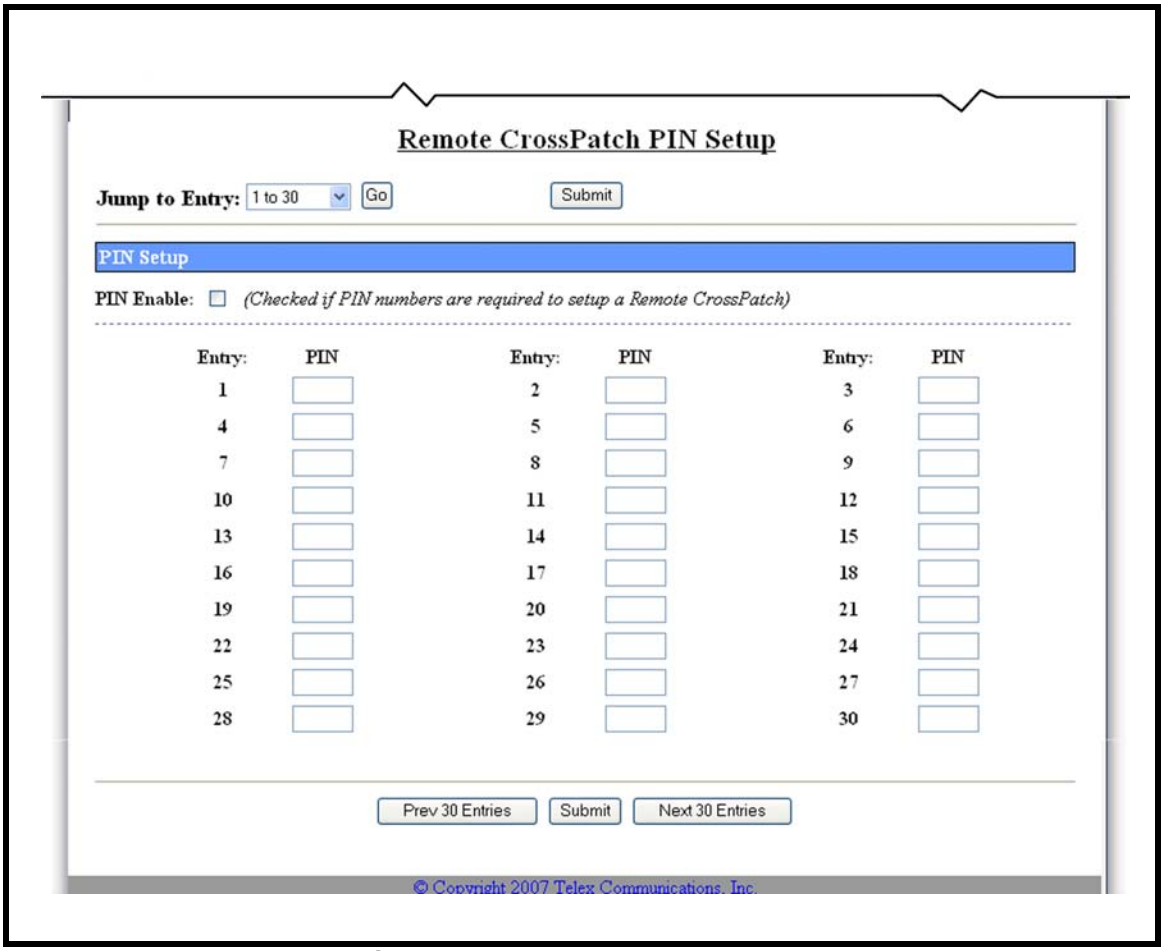

FIGURE 131. Remote Crosspatch Pin

When PIN numbers are entered correctly, a Go-Ahead Beep sequence to indicate success or failure is played back on the console indicating RCP setup is ready.

NOTE: The Interdigit Time field entry on the Crosspatch Setup window also applies to PIN entry.

Jump To Entry Drop Down Menu and Go Button

The **Jump To Entry** drop down menu allows you to select (in groups of 30) function tones to view and modify.

1. From the Jump To drop down menu, select the **entries** you want to view.
2. Click **GO**.
   The function tones you select appears.

Submit Button

The **Submit** button is used to upload changes to the IP-223.

IMPORTANT: The submit button saves changes in temporary memory only.

To **permanently save changes,** do the following:

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console.

PIN Setup

PIN Enable Check Box

The **PIN Enable** check box indicates whether or not a PIN number is required to create a crosspatch. If selected, a PIN number is required to create a crosspatch.

Entry Field

The **Entry** field allows for 300 PIN numbers.

PIN Field

The **PIN** field identifies the PIN for the displayed crosspatch entry number.

The range for this field is a *4-digit* PIN.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

IMPORTANT: The Submit button saves changes in temporary memory only.

To **permanently save changes,** do the following:

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Prev 30 Entries Button

The **Prev 30 Entries** button is used to traverse the window between crosspatch PIN entries 1 and 300.

Next 30 Entries Button

The **Next 30 Entries** button is used to traverse the window between crosspatch PIN entries 1 and 300.

To **define crosspatch PIN numbers**, do the following:

1. From the links, select **CRP PIN Table**.
The Remote CrossPatch Pin Setup window appears.
2. Select the **PIN Enable** check box if a PIN number is required to create a crosspatch.
3. In the PIN field, enter a **PIN number** for the crosspatch number.
4. Continue entering a **four digit PIN number** for the crosspatch numbers until all required PIN entries are complete on the window.
5. If all of the PIN entries are complete on the window and more PINs need to be defined, click **Submit**.
The entries currently displayed on the window are sent to the IP-223 for storage.
OR
If all required Crosspatch PIN entries are complete on the window and no more PINs need to be defined, click **Submit**
AND
proceed to **step 9**.
The entries currently displayed on the window are sent to the IP-223 for storage.
6. Click the **Next 30** button to move to the next Remote CrossPatch Pin Setup window.
7. Repeat the **steps 3 though 5 above** to continue entering the Crosspatch PIN entries until all of the required PIN entries have been completed.
8. After all PINs have been entered, click **Submit**.
The entries currently displayed on the window are sent to the IP-223 for storage.
9. From the links, select **Save to EEPROM**.
The Save Setup Parameters window appears.
10. Click **Save Parameters**.
The entries are saved to permanent memory.

Pass Change Window

The **Account Password Change** window is used to assign a password, see “Accessing IP-223 Web Browser Configuration Windows” on page 39.

NAVIGATION: Clicking **Pass Change** displays the *Account Password Change* window shown in Figure 132.

FIGURE 132. Account Password Change

Enter the desired four-digit number in the provided fields. If the two (2) PINs entered are the same, the password number is entered into memory. The password is required to be entered in the Password field on the Connect to [IP Address] window to access the web setup windows for the IP-223.

NOTE: The password entered does not take effect until the IP-223 has been reset.

To **define a password for the administrator’s user name**, do the following:

NOTE: Make note of the new password before adding or changing a password number.

1. From the links, select **Pass Change**.
   The administrator’s Account Password Change window appears.
2. In the New Password field, enter a four digit **password number**.
3. In the Confirm Password field, enter the four digit **password number** assigned in the previous step.
4. Click **Submit**.
   The entries currently displayed on the window are sent to the IP-223 for storage.
5. From the links, select **Save to EEPROM**.
   The Save Setup Parameters window appears.
6. Click **Save Parameters**.
   The entries are saved to permanent memory.
7. Click **Reset IP-223.**
   A momentary loss of connectivity occurs and the window shown in Figure 120 appears. The connection is restored in several seconds.

Tone Frequency & Durations Window

The **Tone Frequency and Durations** window identifies frequencies and function tones. The IP-223 is capable of generating the standard tone packages required to control a radio with a tone termination panel. The fields on this window are described on the following pages.

NAVIGATION: Clicking **Tone Frequency & Durations** displays the Tone Frequency and Durations window shown in Figure 133.

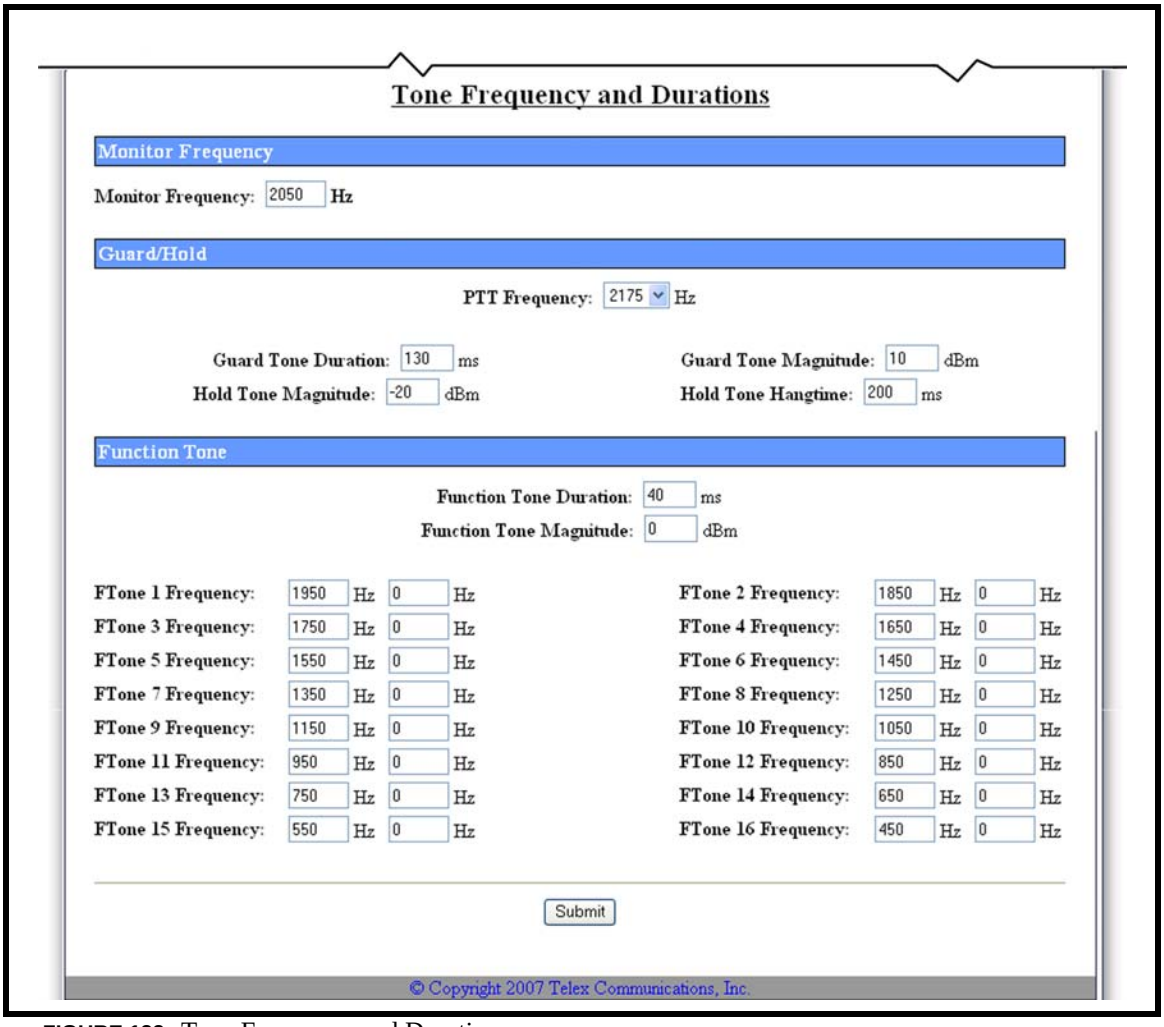

FIGURE 133. Tone Frequency and Durations

Monitor Frequency

Monitor Frequency Field

The **Monitor Frequency** field identifies the value, in Hz, of the function tone sent when the MON button on the console is pressed. In most cases, this value is set at 2050Hz.

The range for this field is *0* to *3200 Hz*.

Guard Hold

PTT Frequency Drop Down Menu

The **PTT Frequency** drop down menu, shown in Figure 134, identifies the PTT frequency, in Hz, the console uses.

Available selections for this field are: *2100, 2175, 2300, 2325, 2400, 2600, 2800, 2850 and 2970Hz.*

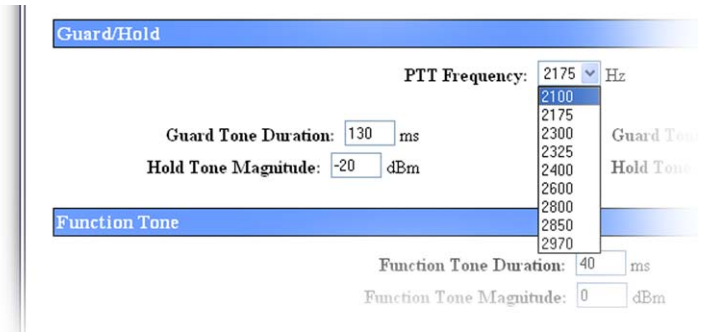

FIGURE 134. PTT Frequency Drop Down Menu

Guard Tone Duration Field

The **Guard Tone Duration** field identifies the amount of time, in ms, the guard tone plays before the function tone.

The range for this field is *0* to *999ms*.

Guard Tone Magnitude Field

The **Guard Tone Magnitude** field identifies the level, in dBm, of the guard tone.

The range for this field is *-60* to *12dB*.

Hold Tone Magnitude Field

The **Hold Tone Magnitude** field identifies the level, in dBm, of the hold tone summed with TX audio to keep the radio in a transmit state.

The range for this field is *-60* to *12dB*.

Hold Tone Hangtime Field

The **Hold Tone Hangtime** field identifies the amount of time, in ms, the hold tone continues after the release of the PTT button. Pressing the PTT button again during this hangtime continues the transmission without resending the guard and function tones.

The range for this field is *0* to *999ms*.

Function Tone

Function Tone Duration Field

The **Function Tone Duration** field identifies the duration, in ms, of the function tone. When dual function tones are set, both tones are set to this duration. In most cases, this value is set to 40ms.

The range for this field is *0* to *999ms*.

Function Tone Magnitude Field

The **Function Tone Magnitude** field identifies the level, in dBm, of the function tone.

The range for this field is *-60* to *12dB*.

FTone 1-16 Frequency Fields

The **FTone 1-16 Frequency** fields identify the value, in Hz, associated with each function tone burst. If the second value is set at zero (0), no second function tone is sent. The standard function tones and their frequencies are shown in Table 7

The range for this field is *0* to *3200 Hz*.

TABLE 7. Standard Function Tone Frequencies

Function Tone Number	Frequency (Hz)	Function Tone Number	Frequency (Hz)
F1	1950	F9	1150
F2	1850	F10	1050
F3	1750	F11	950
F4	1650	F12	850
F5	1550	F13	750
F6	1450	F14	650
F7	1350	F15	550
F8	1250	F16	450

To **define the frequencies and function tones**, do the following:

1. From the links, select **Tone Frequency & Durations**.
   The Tone Frequency and Durations window appears.
2. From the PTT Frequency drop down menu, select the **PTT frequency** (in Hz).
3. In the Guard Tone Duration field, enter the **amount of time** (in ms) the guard tone plays before the function tone.
4. In the Guard Tone Magnitude field, enter the **level** (in dBM) of the guard tone.
5. In the Hold Tone Magnitude field, enter the **level** (in dBM) of the hold tone summed with TX audio to keep the radio in a transmit state.
6. In the Hold Tone Hangtime field, enter the **amount of time** (in ms) the hold tone continues after the release of the PTT button.
7. In the Function Tone Duration field, enter the **duration** (in ms) of the function tone.
8. In the Function Tone Magnitude field, enter the **level** (in dBM) of the function tone.

9. In the Monitor Frequency field, enter the **frequency** (in Hz) of the function tone sent when the MON button on the console is pressed.

   NOTE: In the FTone 1-16 Frequency fields, the standard frequencies associated with each function tone are provided in the first field for the function tone. To change the frequency for a function tone, enter the desired **frequency** (in Hz) in the field provided.

10. In the frequency field, enter the **desired frequency (in Hz)**.
11. Enter the desired **frequency** (in Hz) for the second function tone. An entry of zero (0) indicates no second function tone is sent.
12. Click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
13. From the links, select **Save to EEPROM**.
    The Save Setup Parameters window appears.
14. Click **Save Parameters**.
    The entries are saved to permanent memory.

CHAPTER 5

Update Firmware

Update Firmware

Telex VoIP Hardware firmware can be updated using **TSM** (Telex System Manager). A copy of TSM is available on the CD included in the shipment with the VoIP hardware or can be downloaded from the Telex website at www.telex.com/RadioDispatch/.

NOTE: VoIP hardware includes the following Telex devices: IP-223, IP-2002, IP-1616, C-6200 and NEO-10.

NOTE: TSM uses .tfb (Telex Firmware Binary) files to update VoIP firmware.

Install TSM

To **install TSM**, do the following:

1. Locate the **setup.exe file** on the Telex CD.
   OR
   Download **TSM** from www.telex.com/Downloads/, see “Download Telex Firmware” on page 119.
2. Double-click **setup.exe**.
   The Telex System Manager install window appears.
3. Click **Next**.
   The Select Installation Folder window appears, see Figure 135.

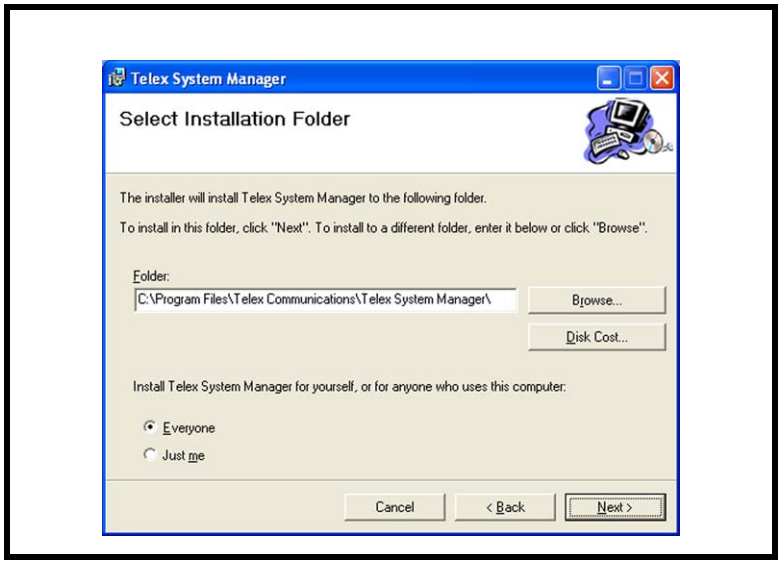

FIGURE 135. Select Installation Folder

4. To specify an installation path for TSM, click **Browse**.
   OR
   To accept the default folder location, leave the **path** entered in the Folder field
   By default, TSM is installed at **C:\Program Files\Telex Communications\Telex System Manager**.
5. To allow any user to access TSM, select **Everyone**.
   OR
   To allow only one user to access TSM, select **Just Me**.
6. Click **Next**.
   The Confirm Installation window appears, see Figure 136.
7. Click **Next**.
   A Please Wait message appears. Once TSM is installed, a success message appears on the Confirm Installation window.
8. Click **Close**.

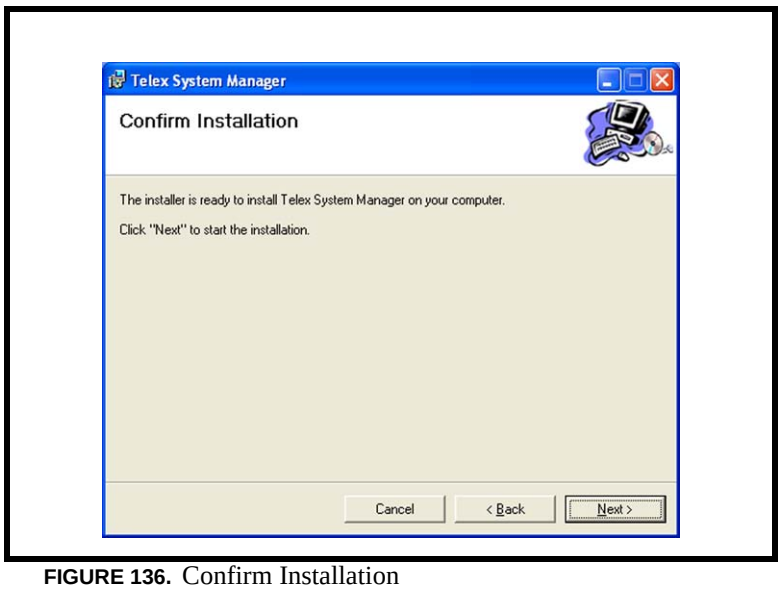

FIGURE 136. Confirm Installation

Download Telex Firmware

When new firmware becomes available it is posted to our website. It can be downloaded at www.telex.com/Downloads/. Check the website periodically for updated firmware.

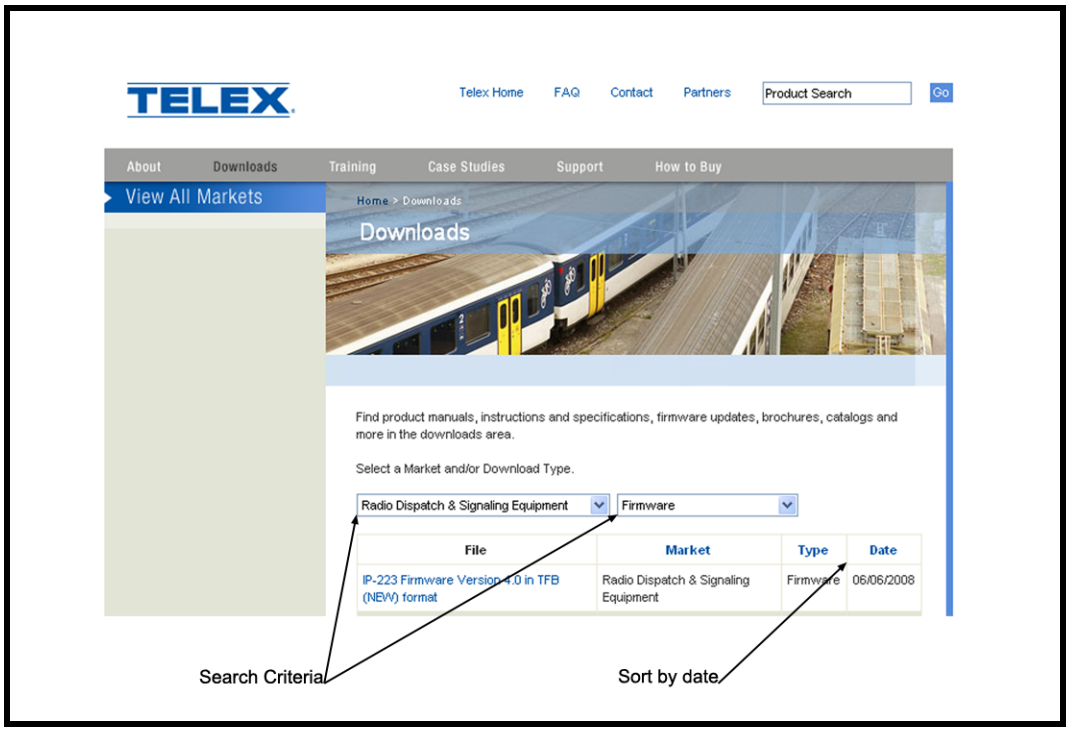

FIGURE 137. Telex Website Firmware Downloads.

To **download updated firmware**, do the following:

1. Set the search criteria to **Radio Dispatch & Signaling Equipment** and **Firmware,** see Figure 137.
2. To sort the files by date, click the **Date column heading**.
3. Locate the **updated firmware file** for your device.
4. Click the **filename**.
   The File Download window opens.
5. Save the **file** to your computer.

Update Firmware Tool Window

NAVIGATION: Selecting *Firmware Update Tool* from the Tools menu opens the Firmware Update Tool window shown in Figure 138.

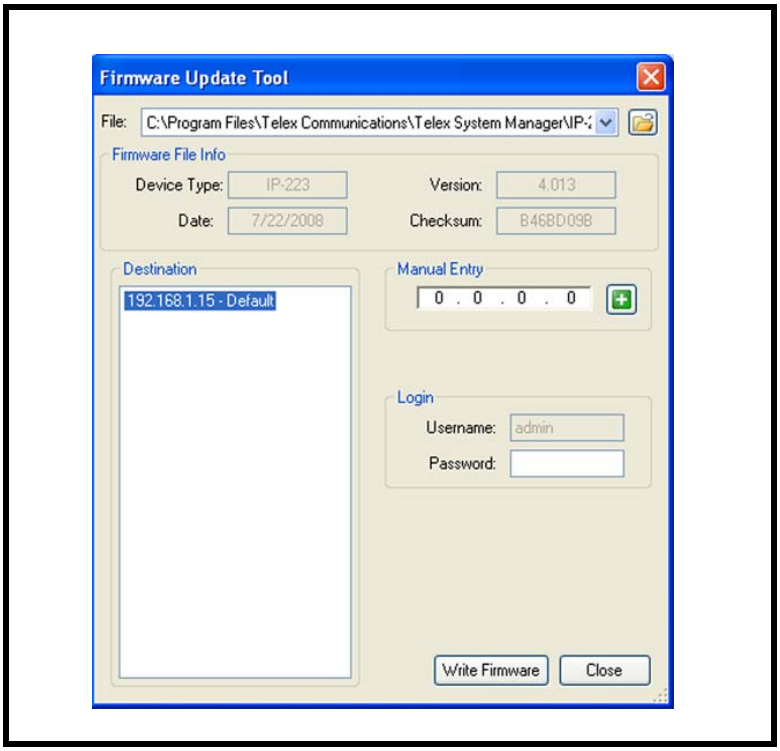

FIGURE 138. Firmware Update Tool

File Field

The **File** field is used to select a firmware file to upload to the VoIP hardware.

Firmware File Info Group Box

Device Type Field

The **Device Type** field displays the type of device supported by the currently selected file in the File field.

Firmware Version Field

The **Firmware Version** field displays the currently selected file's firmware version.

Left Navigation Pane

The **Left Navigation Pane** displays all detected devices from the main dialog's Device list with device types that match the currently selected firmware files. Manually entered IP Addresses also appear in the navigation pane. Once the device is added, it appears in the left navigation pane and is available for selection.

NOTE: If the device you are updating does not automatically appear in the navigation pane, manually enter the IP Address in the Manual Entry field.

Manual Entry Field

The **Manual Entry** field is used to enter the VoIP hardware's IP Address to add to the left navigation pane.

Login Group Box

Username Field

The **Username** field is used to enter the administrator's username.

NOTE: When updating firmware, *admin* is the only administrator's username.

Password Field

The **Password** field is used to enter the administrator's password, if one is required.

Write Firmware Button

The **Write Firmware** button is used to begin the upload process. Once the button is selected, the file specified in the File field is uploaded to the VoIP hardware.

Close Button

The **Close** button is used to close the window.

Upload VoIP Hardware Firmware

Once TSM is installed and your new .tfb file is downloaded, you are ready to upload the VoIP hardware's firmware.

To **upload the VoIP hardware's firmware**, do the following:

1. Click the **TSM shortcut** on your desktop.
   OR
   From your taskbar, click **Start|Programs|Telex Communications|Telex System Manager**.
   The Telex System Manager window opens.
2. Click **Tools|Firmware Update**
   The Firmware Update Tool opens.
3. To locate the .tfb file for upload, click the **folder icon**  .
   The Open window appears.
4. Select the.**tfb file** you want to upload.
   The file is highlighted.
5. Click **Open**.
   The selected file appears in the File field.

   NOTE: If the device does not appear in the list, enter the **VoIP hardware's IP Address** in the Manual Entry field and click the **Add** button  . *The IP Address appears in the left navigation pane.*
6. In the left navigation pane, select the device's **IP Address**.
   The Write Firmware button is active.
7. Click the **Write Firmware** button.
   Firmware update messages are shown in the Status column which provides feedback on the firmware update progress. Once the progress reaches 100%, the firmware is updated.

   NOTE: If an error occurs, the Progress column is reset and an error message appears in the Status column.

NOTE: Once the firmware is uploaded, the device resets.

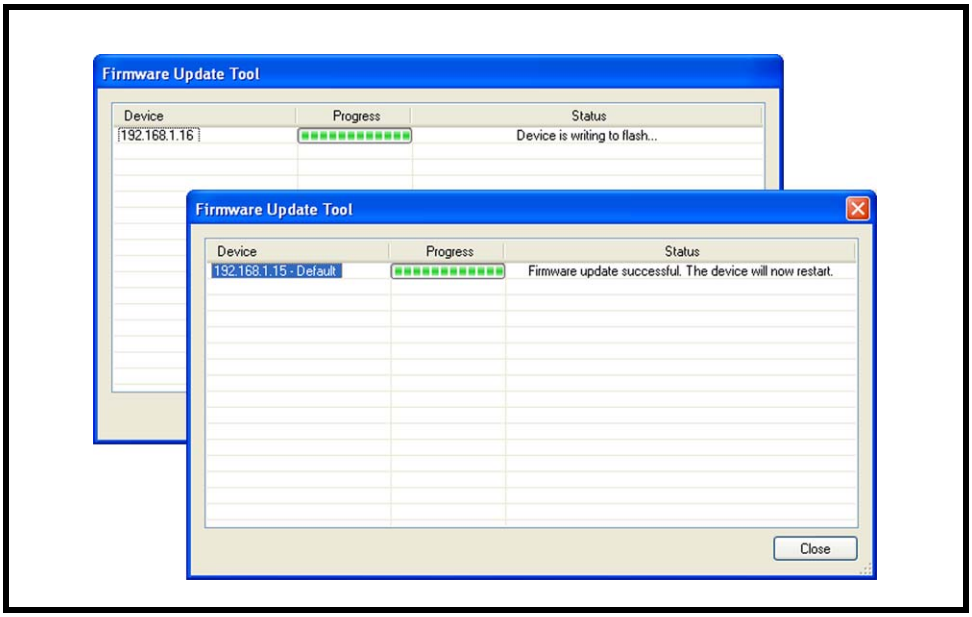

FIGURE 139. Firmware Update Tool— Success Messages

8. Click **Close**.
   The dialog window closes.
9. Click **Close**.

To **access the webpage directly from the Firmware Update Tool window**, do the following:

1. Right-click the device's **entry**.
   The Flyout menu appears.
2. From the context menu, click **Webpage**.
   The Connect To window opens.
3. In the User Name field, enter a **user name**.
4. In the Password field, enter a **password**.
5. Click **OK**.
   The Web Browser's Configuration Welcome window opens.

IP-223 Settings - Quick Reference

I/O Connectors

Connector	Description
J1	Power IN
J18	Serial port
J2	Radio/Line 1
J31	Radio/Line 2
J4	Display Header
J66	Handset Jack
J7	Ethernet port

Adjustments

Signal	Line 1	Test point	Line 2	Test point
RX Pre-amp	R175	TP13	R110	TP1
RX Compressor	RV5	TP12	RV1	TP3
TX Audio out	R47	TP15	R61	TP5
TX Monitor IN (Not available in 750630 Rev A)	R390	TP13	R391	TP1
CTCSS out	R50	TP7	R53	TP10

PCB 750743 or PCB 750630 revision F

Line 1	Jumper Setting	Line 2
J35	"A" = RS232 serial data, "B" = TTL	J26

PCB 750743 or PCB 750630 revision C, D, E, and F

Line 1	Jumper Setting	Line 2
J33, J34	2 or 4 Wire, "A" = 2-wire, "B" = 4-wire	J5, J6
J16, J21	RX Input, "A" = Single ended, "B" = Balanced	J19, J20
J14	RX Input Impedance, “A” = 600, “B” = 8 and Center = 10Kohm	J24
J3, J9, J11	TX Output, “A” = Single ended, “B” = Balanced	J25, J28, J29
J13	TX Output Level, “A” = Low, “B” = High	J27
J8	Digital I/O Pull-up Voltage, “A” = +5, “B” = +12	J30
J17, J22	TX Output Impedances: “B” = 600 ohms	J10, J15
(J17), J22	(“A”) and “B” = 1.2K ohms	(J10), J15
J17, (J22)	“A” and (“B”) = 1.8K ohms	J10, (J15)
J17, J22	“A” = 2.4K ohms	J10, J15

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Line 1	Jumper Setting	Line 2
J33, J34	2 or 4 Wire, “A” = 2-wire, “B” = 4-wire	J5, J6
J15, J16, J21	RX Input, “A” = Single ended, “B” = Balanced	J19, J20, J22
J14, J23	RX Input Impedances: “B” = 10K ohms	J24, J17
(J14), J23	(“A”) and “B” = 600 ohms	(J24), J17
(J23), J14	(“A”) and “B” = 8 ohm speaker	(J17), J24
J3, J9, J10, J11	TX Output, “A” =Single ended, “B” = Balanced	J25, J26, J28, J29
J13	TX Output Level, “A” = Low, “B” High	J27
J8	Digital I/O Pull-up Voltage, “A” = +5, “B” = +12	J30

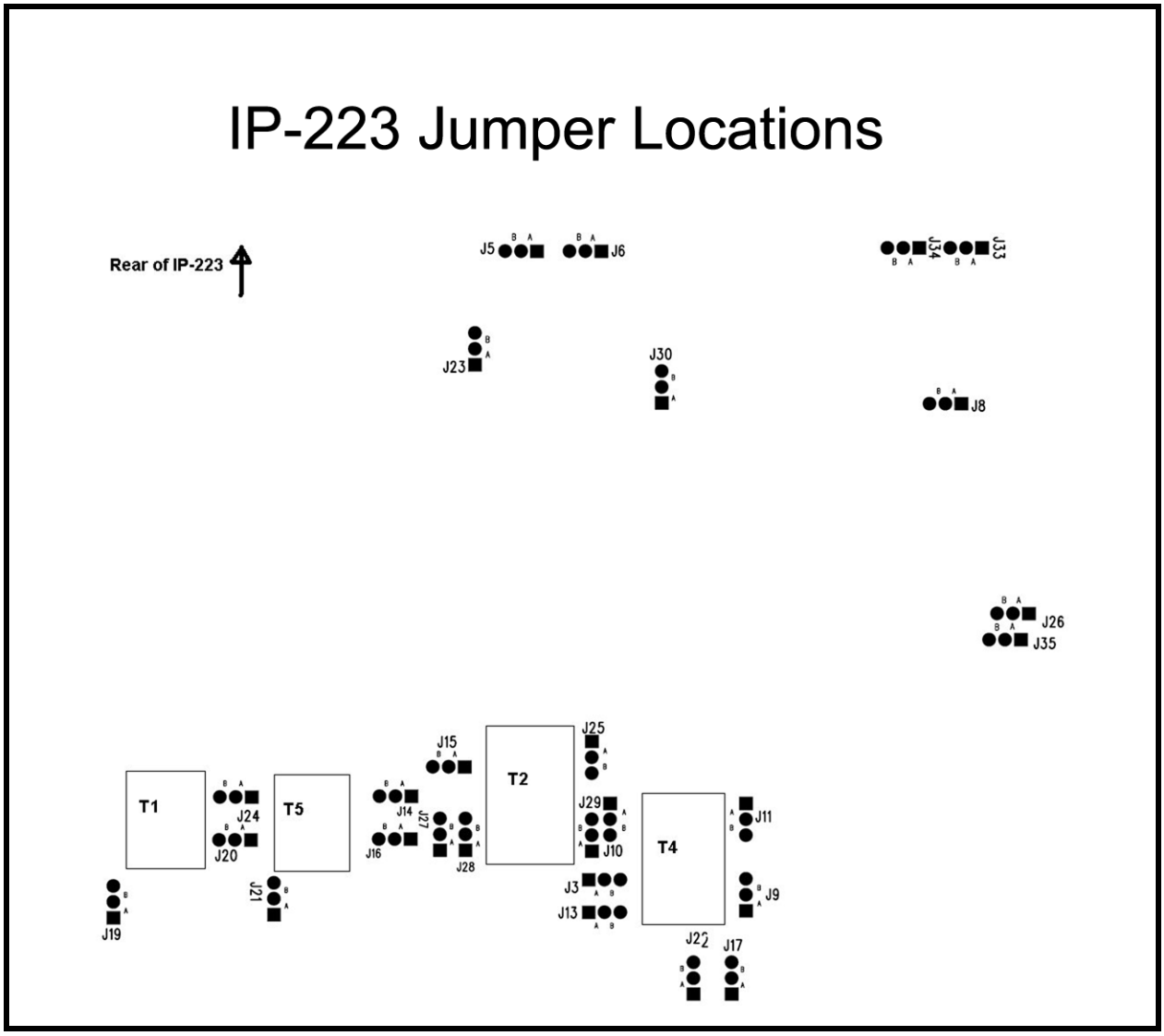

FIGURE 140. Jumper Locations

Additional Resources

Additional Resources

Below is a compilation of resources ranging from the technology used in Radio Dispatch products, as well as application guides describing how to configure the radio dispatch products with many of the radios used with those products.

NOTE: Because white papers and application guides are always being written and posted to this site, please visit http://www.telex.com/RadioDispatch/Default.aspx, and then click **Downloads**, for the most current list of publication offerings.

FILE	Application Guides
AN-VEGA-10 Moto XTL-5000	***Motorola XTL - 5000 Radios to 223 Series Adapter Panel*** This application note is intended to show how to assemble a cable and setup the hardware of different 223 series adaptor panels (TRA223, DSP223 and IP223) to a Motorola XTL-5000 series mobile radio.
AN-VEGA-7 Cross Band Repeater	***Creating Cross Band Repeaters or Extended Radio Coverage Using IP-223s*** This application guide is intended to show how to create a cross band repeater or extend coverage using IP-223s in either a LAN (Local Area Network) or WAN (Wide Area Network).
AN-VEGA-1 Kenwood Fleetsync	***Kenwood Radio - Series 80, 90, and 150/180 To IP-223*** This application guide is intended to show how to assemble the cable and setup the hardware of the IP-223 for channel change and Fleetsync applications using Kenwood radios.
AN-VEGA-4 223 EFJ5300	***EF Johnson - Series 5300 radio to the 223 Series Adaptor Panels*** This application guide is intended to show how to assemble a cable and setup the hardware of different 223 series adaptor panels (TRA223, DSP223 and IP223) to the EF Johnson 5300 mobile radio.

AN-VEGA-19
223 - Relm RM Series

RELM - RM Series Radios to 223 Series Adaptor Panels

This application guide is intended to show how to assemble a cable and setup hardware of different 223 series adaptor panels (TRA223, DSP223, and IP223) to a Relm RM series mobile radio.

AN-VEGA-18
223 Vertex VX 4100-4200

Vertex Standard - VX-4100/4200 Series Radios to 223 Series Adaptor Panels

This application guide is intended to show how to assemble a cable and setup hardware of different 223 series adaptor panels (TRA223, DSP223, and IP223) to the VX-4100/4200 series mobile radio.

AN-VEGA-15
223 - Datron Guardian

Datron - Guardian Series Mobile to 223 Series Adaptor Panels

This application guide is intended to show how to assemble a cable and setup hardware of different 223 series adaptor panels (TRA223, DSP223, IP223) to the Datron Guardian Mobile radio.

AN-VEGA-13
ANI Capabilities

Telex Radio Dispatch ANI Capabilities

This application guide is intended to educate the reader on Automatic Numerical Identification (ANI) and, specifically, the support for ANI within the Radio Dispatch products.

AN-VEGA-11
Sepura

Sepura - SRM2000 - IP223 Interface

This application guide is intended to describe the interface between the IP223 and the Sepura 2000 Mobile TETRA radio. The contents include: physical connections, diagrams, IP-233 setup, SRM2000 setup, and C-Soft PC console configuration.

AN-VEGA-9
223 Motorola CDM-Pro Series

Motorola - CDM/GM/PRO Series Radios to 223 Series Adaptor Panels

This application guide is intended to show how to assemble a cable and setup the hardware of different 223 series adaptor panels (TRA223, DSP223, and IP223) to a Motorola CDM, GM, PRO series mobile radio.

AN-VEGA-5
DSP-TRA Motorola Mobiles

Motorola - Radius, M10, M100, M120, M130, M200, GM300, SM50, SM120, and Maxtrac 100/300 Series Radios to TRA223 & DSP223 Series Adaptor Panels

This application guide is intended to show how to assemble a cable and setup the hardware of the TRA223 and DSP223 for single channel control to the following Motorola radios: Radius, M10, M100, M120, M130, M200, GM300, SM50, SM120 and Maxtrac 100/300.

AN-VEGA-6
IP-Motorola Mobiles

Motorola - Radius, M10, M100, M120, M130, M200, GM300, SM50, SM120, and Maxtrac 100/300 Series Radios to IP223 Series Adaptor Panels

This application guide is intended to show how to assemble a cable and setup the hardware of the IP223 for single channel control to the following Motorola radios: Radius, M10, M100, M120, M130, M200, GM300, SM50, SM120 and Maxtrac 100/300.

AN-VEGA-17 IP223 Relm GMH

RELM - GMH Radios to IP-223 Adaptor Panels

This application guide is intended to show how to assemble a cable and setup the hardware of the IP-223 adaptor panel to a Relm GMH series mobile radio.

AN-VEGA-12 iDEN-IP223 to Tone

iDEN Radio Control on Legacy Tone Systems using IP-223s

This application guide is intended to show how to configure and connect the Telex/Vega IP-223, NI223 and an iDEN radio to a legacy tone control system and provide direct connect to an operator.

AN-VEGA-20 223 Moto MCS2000

Motorola - MCS2000 Radios to 223 Series Adaptor Panels

This application guide is intended to show how to assemble a cable and setup the hardware of different 223 series adaptor panels (TRA223, DXP223, and IP223) to a Motorola MCS2000 series mobile radio.

AN-VEGA-22 223 - ICOM F121-221

ICOM - IC-F121/221 Series Radio to 223 Series Adaptor Panels

This application guide is to show how to assemble a cable and setup the hardware of different 223 series adaptor panels (TRA223, DSP223, and IP223) to the ICOM F121/221 mobile radio.

AN-VEGA-23 223 - Kenwood TK6110

Kenwood - TK-6110 Series Radio to 223 Series Adaptor Panels

This application guide is to show how to assemble a cable and setup the hardware of different 223 series adaptor panels (TRA223, DSP223, and IP223) to a Kenwood TK-3110 series mobile radio.

White Papers

IP White Paper

IP Radio System Application Guide (White Paper)

This white paper is intended to introduce potential customers to the options and technologies available from Telex Vega for the remote control and monitoring of multiple radio channels. While the subject of tone control will be discussed from a historical point of view, the focus of this document is Radio control over Internet Protocol, or RoIP. RoIP is a subset of the larger entity, known as Voice over IP or VoIP throughout this document.

An Introduction To IP

An Introduction to IP-Based Radio Dispatch (White Paper)

This white paper is intended to be an high-level introduction to the IP-based Radio Dispatch technology. Some topics discussed in this paper are: VoIP, RoIP, TCP/IP, UDP/IP, and other IP-based technologies.

CTCSS Tone Frequency Table

CTCSS Tone Frequency Table

TABLE 8. CTCSS Tone Frequencies

Tone Number	Freq. (Hz)	Tone Number	Freq. (Hz)	Tone Number	Freq. (Hz)	Tone Number	Freq. (Hz)
1	33.0	17	71.9	33	123.0	49	183.5
2	35.4	18	74.4	34	127.3	50	186.2
3	36.6	19	77.0	35	131.8	51	189.9
4	37.9	20	79.7	36	136.5	52	192.8
5	39.6	21	82.5	37	141.3	53	196.6
6	44.4	22	85.4	38	146.2	54	199.5
7	47.5	23	88.5	39	151.4	55	203.5
8	49.2	24	91.5	40	156.7	56	206.5
9	51.2	25	94.8	41	159.8	57	210.7
10	53.0	26	97.4	42	162.2	58	218.1
11	54.9	27	100.0	43	165.5	59	225.7
12	56.8	28	103.5	44	167.9	60	229.1
13	58.8	29	107.2	45	171.3	61	233.6
14	63.0	30	110.9	46	173.8	62	241.8
15	67.0	31	114.8	47	177.3	63	250.3
16	69.4	32	118.8	48	179.9	64	254.1

Digital Output Table

Digital Output Table

TABLE 9. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
0	L	L	L	L	L	L	L
1	L	L	L	L	L	L	H
2	L	L	L	L	L	H	L
3	L	L	L	L	L	H	H
4	L	L	L	L	H	L	L
5	L	L	L	L	H	L	H
6	L	L	L	L	H	H	L
7	L	L	L	L	H	H	H
8	L	L	L	H	L	L	L
9	L	L	L	H	L	L	H
10	L	L	L	H	L	H	L
11	L	L	L	H	L	H	H
12	L	L	L	H	H	L	L
13	L	L	L	H	H	L	H
14	L	L	L	H	H	H	L
15	L	L	L	H	H	H	H
16	L	L	H	L	L	L	L
17	L	L	H	L	L	L	H
18	L	L	H	L	L	H	L
19	L	L	H	L	L	H	H
20	L	L	H	L	H	L	L
21	L	L	H	L	H	L	H
22	L	L	H	L	H	H	L
23	L	L	H	L	H	H	H
24	L	L	H	H	L	L	L
25	L	L	H	H	L	L	H
26	L	L	H	H	L	H	L
27	L	L	H	H	L	H	H
28	L	L	H	H	H	L	L
29	L	L	H	H	H	L	H
30	L	L	H	H	H	H	L
31	L	L	H	H	H	H	H
32	L	H	L	L	L	L	L
33	L	H	L	L	L	L	H

TABLE 9. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
34	L	H	L	L	L	H	L
35	L	H	L	L	L	H	H
36	L	H	L	L	H	L	L
37	L	H	L	L	H	L	H
38	L	H	L	L	H	H	L
39	L	H	L	L	H	H	H
40	L	H	L	H	L	L	L
41	L	H	L	H	L	L	H
42	L	H	L	H	L	H	L
43	L	H	L	H	L	H	H
44	L	H	L	H	H	L	L
45	L	H	L	H	H	L	H
46	L	H	L	H	H	H	L
47	L	H	L	H	H	H	H
48	L	H	H	L	L	L	L
49	L	H	H	L	L	L	H
50	L	H	H	L	L	H	L
51	L	H	H	L	L	H	H
52	L	H	H	L	H	L	L
53	L	H	H	L	H	L	H
54	L	H	H	L	H	H	L
55	L	H	H	L	H	H	H
56	L	H	H	H	L	L	L
57	L	H	H	H	L	L	H
58	L	H	H	H	L	H	L
59	L	H	H	H	L	H	H
60	L	H	H	H	H	L	L
61	L	H	H	H	H	L	H
62	L	H	H	H	H	H	L
63	L	H	H	H	H	H	H
64	H	L	L	L	L	L	L
65	H	L	L	L	L	L	H
66	H	L	L	L	L	H	L
67	H	L	L	L	L	H	H
68	H	L	L	L	H	L	L
69	H	L	L	L	H	L	H
70	H	L	L	L	H	H	L
71	H	L	L	L	H	H	H

TABLE 9. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
72	H	L	L	H	L	L	L
73	H	L	L	H	L	L	H
74	H	L	L	H	L	H	L
75	H	L	L	H	L	H	H
76	H	L	L	H	H	L	L
77	H	L	L	H	H	L	H
78	H	L	L	H	H	H	L
79	H	L	L	H	H	H	H
80	H	L	H	L	L	L	L
81	H	L	H	L	L	L	H
82	H	L	H	L	L	H	L
83	H	L	H	L	L	H	H
84	H	L	H	L	H	L	L
85	H	L	H	L	H	L	H
86	H	L	H	L	H	H	L
87	H	L	H	L	H	H	H
88	H	L	H	H	L	L	L
89	H	L	H	H	L	L	H
90	H	L	H	H	L	H	L
91	H	L	H	H	L	H	H
92	H	L	H	H	H	L	L
93	H	L	H	H	H	L	H
94	H	L	H	H	H	H	L
95	H	L	H	H	H	H	H
96	H	H	L	L	L	L	L
97	H	H	L	L	L	L	H
98	H	H	L	L	L	H	L
99	H	H	L	L	L	H	H
100	H	H	L	L	H	L	L
101	H	H	L	L	H	L	H
102	H	H	L	L	H	H	L
103	H	H	L	L	H	H	H
104	H	H	L	H	L	L	L
105	H	H	L	H	L	L	H
106	H	H	L	H	L	H	L
107	H	H	L	H	L	H	H
108	H	H	L	H	H	L	L
109	H	H	L	H	H	L	H
110	H	H	L	H	H	H	L
111	H	H	L	H	H	H	H
112	H	H	H	L	L	L	L
113	H	H	H	L	L	L	H
114	H	H	H	L	L	H	L
115	H	H	H	L	L	H	H
116	H	H	H	L	H	L	L

TABLE 9. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
117	H	H	H	L	H	L	H
118	H	H	H	L	H	H	L
119	H	H	H	L	H	H	H
120	H	H	H	H	L	L	L
121	H	H	H	H	L	L	H
122	H	H	H	H	L	H	L
123	H	H	H	H	L	H	H
124	H	H	H	H	H	L	L
125	H	H	H	H	H	L	H
126	H	H	H	H	H	H	L
127	H	H	H	H	H	H	H
128	H	L	L	L	L	H	L

Tone Frequency Table

Tone Frequency Table

TABLE 10. Supported Radio Dispatch Tone Frequencies

Tone Number	Code Digit	European Tone Frequencies in Hz												Motorola	
		ZVEI1	ZVEI2	KEN	PZVE I	DZVEI	PDZVEI	CCIR1	CCIR2	PCCIR	EEA	EURO SIGNAL	NATE L	EIA	MODAT
TONE 0	0	2400	2400	815	2400	2200	2200	1981	1981	1981	1981	979.8	1633	600	637.5
TONE 1	1	1060	1060	882	1060	970	970	1124	1124	1124	1124	903.1	631	741	787.5
TONE 2	2	1160	1160	954	1160	1060	1060	1197	1197	1197	1197	832.5	697	882	937.5
TONE 3	3	1270	1270	1032	1270	1160	1160	1275	1275	1275	1275	767.4	770	1023	1087.5
TONE 4	4	1400	1400	1117	1400	1270	1270	1358	1358	1358	1358	707.4	852	1164	1237.5
TONE 5	5	1530	1530	1209	1530	1400	1400	1446	1446	1446	1446	652.0	941	1305	1387.5
TONE 6	6	1670	1670	1308	1670	1530	1530	1540	1540	1540	1540	601.0	1040	1446	1537.5
TONE 7	7	1830	1830	1415	1830	1670	1670	1640	1640	1640	1640	554.0	1209	1587	1687.5
TONE 8	8	2000	2000	1531	2000	1830	1830	1747	1747	1747	1747	510.7	1336	1728	1837.5
TONE 9	9	2200	2200	1657	2200	2000	2000	1860	1860	1860	1860	470.8	1477	1869	1987.5
GROUP TONE	A	2800	885	1939	970	825/ 885	825	2400		1050	1055			2151	
	B	810	810	2270	810	740	886	930		930	930			2292	
RESET TONE	C	970	740	2098	2800	2600	2600	2247		2400	2247			2010	
	D	885	680	2457	885	885	856	991	2110	991	991			2292	
REPEAT TONE	E	2600	970	1792	2600	2400	2400	2110	2400	2110	2110	1062.9	1805	459	487.5
	F	680	2600		680	680		1055	2400	1995	1091		1995	1091	